

SAE 2011

Alternative Refrigerant and System Efficiency Symposium

September 27-29, 2011

Xona Resort Suites, Scottsdale, Arizona USA

EVENT GUIDE



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SAE 2011

Automotive Refrigerant and System Efficiency

Symposium

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WHAT'S INSIDE



Symposium Overview	2
Welcome	3
General Information	4
Organizers	7
Technical Sessions	8
Speaker Biographies	12
Sponsors	20



Monday September 26	Tuesday September 27	Wednesday September 28	Thursday September 29
1:00 – 5:00 p.m. Registration	7:00 a.m. – 5:00 p.m. Registration	7:00 a.m. – 5:00 p.m. Registration	7:00 a.m. – 12:00 p.m. Registration
	7:00 – 8:00 a.m. Breakfast	7:00 – 8:00 a.m. Breakfast	7:00 – 8:00 a.m. Breakfast
	8:00 – 9:40 a.m. Regulatory Issues related to MAC	8:00 – 9:40 a.m. Alternative Refrigerant Systems	8:00 – 9:40 a.m. Risk Assessments and Alternative MAC Systems
	9:40 – 10:00 a.m. Break	9:40 – 10:00 a.m. Break <i>Sponsored by</i> 	9:40 – 10:00 a.m. Break
	10:00 – 11:30 a.m. MAC Fuel Consumption and New Refrigerant Systems	10:00 – 11:30 a.m. MAC Systems for Hybrid and Electric Vehicles	10:00 – 11:30 a.m. MAC Components
	12:00 – 1:30 p.m. Lunch	12:00 – 1:30 p.m. Lunch	12:00 – 1:30 p.m. Lunch
	12:00 – 3:00 p.m. Ride 'n Drive	12:00 – 3:00 p.m. Ride 'n Drive	12:00 – 3:00 p.m. Ride 'n Drive
	3:00 – 5:30 p.m. ICCC Standards Meeting	3:00 – 5:00 p.m. OEM meeting on MAC Fuel Consumption	3:00 – 5:00 p.m. OEM Meeting
	6:00 – 7:00 p.m. Welcome Reception	6:00 – 7:00 p.m. Reception <i>Sponsored by</i> 	

Technical Sessions

*No Audio or Video recording of presentations is permitted, except by SAE.
Please turn off cell phones and pagers before entering technical session rooms.*

WELCOME

Dear Symposium Participant,

I would like to welcome you to the 2011 Alternative Refrigerant and System Efficiency Symposium. It's been over a year since we last meet in Arizona and a lot of things have happened. The search for a global replacement refrigerant for HFC-134a has been complex, costly, and may not be over.

If you remember last year, at the request of regulatory agencies, the SAE ICCSC conducted an International Work Shop activity during the Phoenix ARSES July meeting. The purpose was to determine if it was possible to establish an industry standard that can be used to identify increased load on a vehicle's engine due to air conditioner usage. This might be used to provide incentives for improved vehicle fuel efficiency and reduced CO₂ emissions. Today, there appears to be no interest to commonize global methods for determining the impact of Mobile Air Conditioning on vehicle fuel consumption. It remains an open issue as to how the industry will address MAC system energy use.

The SAE Interior Climate Control Standards Committee has over 50 published documents covering MAC systems. Experience indicates that we must re-visit some of the documents on an on-going basis to provide current information and new requirements. To do so, we will need your help and support.

With the current list of SNAP refrigerants and cost differentials available to consumers, the potential hazard of R-1234yf systems becoming contaminated is very real. This will repeat the MAC system and equipment contamination issues the industry experienced during the CFC-12 to HFC-134a transition. Current SAE Standards have addressed mandatory refrigerant identification on certain R-1234yf recovery equipment. However, this does not address the issue of recovery equipment in use "worldwide" in the service industry.

The question of "range" is a major issue for electric and hybrid vehicles and the MAC energy requirements have a huge impact on the range of these vehicles. The potential of reduced MAC system cooling performance to improve range may be the next challenge in keeping the consumer satisfied.

I hope that you are more informed on the issues that are still at hand and the new challenges this industry has once the symposium concludes.

Sincerely,



Ward Atkinson



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Hours of Operation

Registration

The Mesquite Room

Monday, September 26

1:00 – 5:00 p.m.

Tuesday – Wednesday,
September 27-28

7:00 a.m. – 5:00 p.m.

Thursday, September 29

7:00 a.m. – 12:00 p.m.

Lanyards

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General Information

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Special Events

Ride 'n Drive Program

The following are requirements for those planning on participating in the formal Ride 'n Drive event:

- Pre-registration is required for the formal Ride 'n Drive. Participation is based on vehicle availability. Cars will be filled on a first-come, first-serve basis.
- Participation is required each day when you are assigned to a vehicle. This ensures accuracy for the evaluation of the vehicles. **PARTICIPANTS SHOULD NOT REGISTER IF THEY WILL NOT BE AVAILABLE ALL THREE DAYS.**
- Formal Ride 'n Drive participants **MUST** wear slacks and a short sleeved shirt. No shorts will be allowed.
- All participants must sign a liability waiver.
- Drivers must show a valid Driver's License.

Breakfast

*Catalina/Santa Cruz/Sonoran/
Pavilion Patio Rooms*

Tuesday – Thursday,
September 27-29
7:00 – 8:00 a.m.

Break – AM

Pavilion Patio

Tuesday – Thursday,
September 27-29
9:40 – 10:00 a.m.

Lunch

*Catalina/Santa Cruz/Sonoran/
Pavilion Patio Rooms*

Tuesday – Thursday,
September 27-29
12:00 – 1:30 p.m.

Reception – Welcome

The Pavilion Patio

Tuesday, September 27
6:00 – 7:00 p.m.

Reception – Evening

The Pavilion Patio

Wednesday, September 28
6:00 – 7:00 p.m.

Wednesday Break

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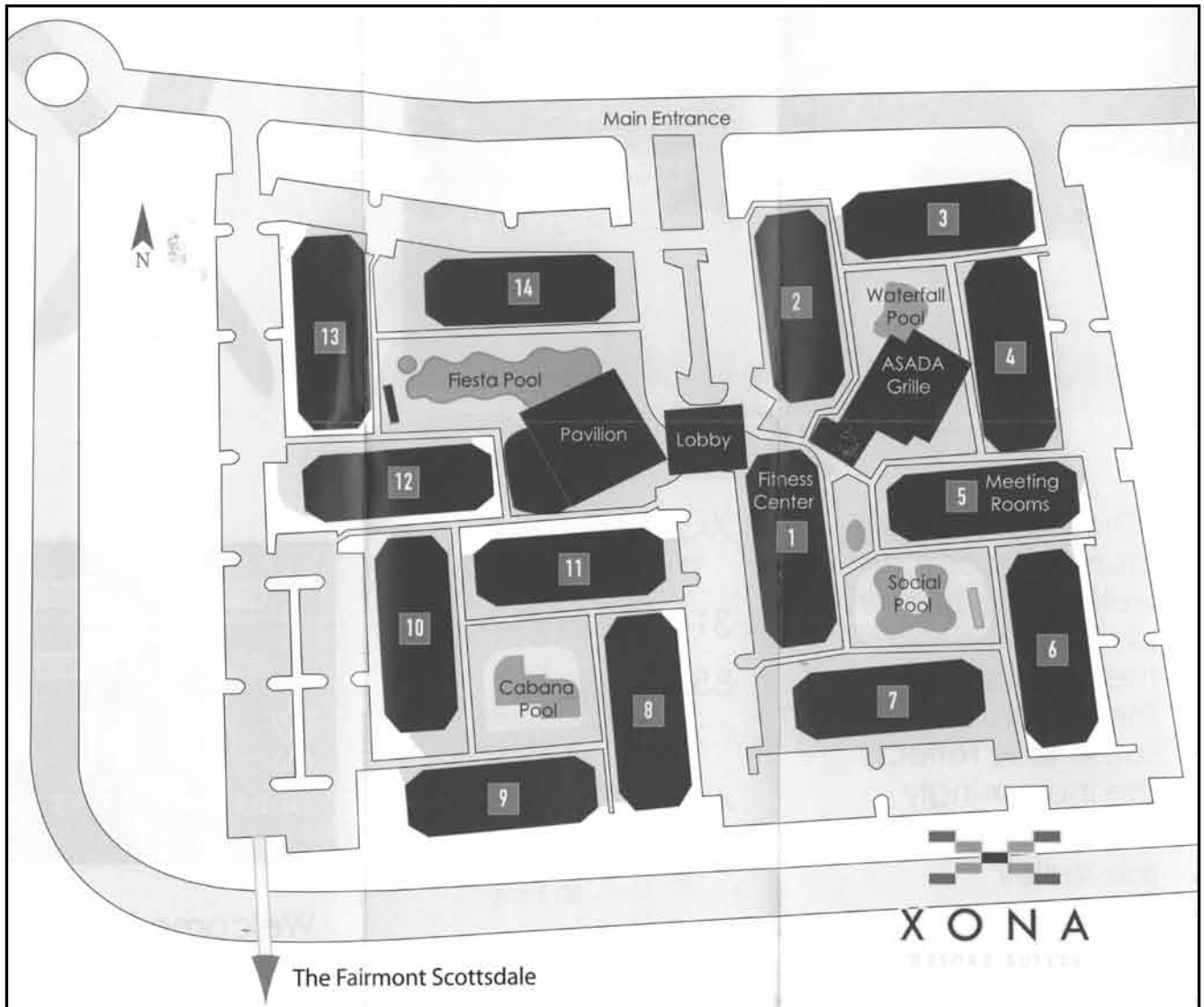
Wednesday Reception


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ORGANIZERS



Ward Atkinson
VCCC, Inc.
President
Sun Test Engineering

Ward Atkinson retired in 1981 from General Motors, Chevrolet Engineering after 30 years of service.

As staff engineer at Chevrolet Engineering he was responsible for divisional and corporate development activities including electrical, engine cooling, heating, ventilation and air conditioning systems for passenger cars and light trucks.

After retiring from Chevrolet he established Sun Test Engineering and has provided consulting services to the automobile industry through this Scottsdale Arizona Company.

As an SAE International member for 56 years and voluntary chairman of the SAE Interior Climate Control Standards Committee has been responsible for development of over 40 SAE Standards, including the air-conditioning documents identified in the U.S. Clean Air Act. The ICCC committee received the U.S. Environmental Protection Agency (EPA) 2003 Climate Protection Award.

In 1998 was awarded the Arch T. Colwell Cooperative Engineering Medal in leadership of the SAE Interior Climate Control Standards Committee.

Received in 1979 and 1991, SAE Technical Board Certificate Of Appreciation and "Outstanding Contribution Award" in 2009.

Since 1991 he has been a member to the United Nations, Montreal Protocol Technical Option Committee for mobile air-conditioning including technical support to the UNEP Fund and World Bank. As a contributor to the UNEP Intergovernmental Panel on Climate Change, in 2007 this group was awarded the Nobel Peace Prize.

In 1990 he received the EPA "Stratospheric Ozone Protection Award" and in 1997 received the EPA "Stratospheric Ozone Protection Best of the Best Award".

Since 1990 has been Technical Advisor to MACS Worldwide (Mobile Air Conditioning Society) and has been responsible for various technical activities including the Certification Training Manual for servicing mobile air conditioning systems, (Requirement in US EPA Clean Air Act) and other training documents and informational reports.

Mr. Atkinson has authored 6 SAE Technical papers and various other technical papers including presentations on mobile air conditioning issues, at SAE Congress, Asia Pacific Conference, China and various U.S. EPA sponsored Conferences and MAC Summits in Asia, Europe and the United States. He has been the developer and organizer of this symposium for the last 12 years.



William Hill
Consultant, HVAC Technical Specialist
MACRAE, LLC

Mr. Hill is self-employed, consulting in the area of HVAC systems. He is a technical advisor to Creative Thermal Solutions. He is the Co-Chair of the Interior Climate Control Committee and

has helped to organize the Alternative Refrigerant System Symposium in Phoenix for the past six years. He chaired the SAE Thermal Committee from 2003-2005 and the SAE Vehicle Thermal Management Symposium [VTMS] during this time. He has chaired five major SAE Cooperative Research Programs over the last 9 years. He has been a session chair for the Climate Control Sessions at SAE Congress for the last 12 years. Mr. Hill has sponsored numerous standards and written twelve SAE papers over the years. He retired from General Motors Corporation in 2009 and has extensive experience in automotive Heating, Ventilation, and Air Conditioning [HVAC]. He worked for a number of divisions of General Motors from 1968 to 2009, finishing as a Technical Fellow in the HVAC area. He also worked for Zexel Corporation [a Japanese HVAC component manufacturer] for five years during this time. He received the SAE Forest R. McFarland Award in 2007. He was an SAE Industrial Lecturer in 1997-98. He received the EPA Climate Protection award in 2005 and again in 2008. He was a Runner-up for SAE Environmental Excellence in Transportation award and received the GM Research Most Valuable Colleague Award in 2008 as well. He has been a judge at Future Truck and Future Car events sponsored by the US Department of Energy as part of the PNGV program. He has 12 patents or patents pending in the HVAC area.

PROGRAM AGENDA

MONDAY

September 26, 2011
Mesquite Room

1:00 – 5:00 p.m.

Registration

TUESDAY

September 27, 2011
Pavilion Room

7:00 a.m. – 5:00 p.m.

Registration

7:00 – 8:00 a.m.

Breakfast

8:00 a.m.

Welcome and Opening Remarks

Ward J. Atkinson, Sun Test Engineering

8:10 a.m.

Design Criteria for Future Mobile Air Conditioning (MAC) Systems Satisfying Future Global Environmental Regulations

Stephen Andersen, IGSD

8:30 a.m.

EPA Updates on Alternative Refrigerants and MVAC Servicing

Yaidi Cancel, Brian J. Nelson, US Environmental Protection Agency

8:50 a.m.

Update on California's Regulatory Activities to Mitigate Greenhouse Gas Emissions from Mobile Air Conditioning

Tao Zhan, Leela Rao, California Air Resources Board

9:10 a.m.

Q&A

For all regulators in previous presentations

9:40 a.m.

BREAK

10:00 a.m.

MAC Fuel Efficiency Test Procedure for Certification Purpose - ACEA Approach

Peter Kunze, ACEA

10:30 a.m.

Benefits and Challenges of Heat Pump Systems

Markus Wawzyniak, Behr GmbH & Co. KG

11:00 a.m.

Impact of Low Refrigerant Charge on Energy Consumption of the MAC System and its Associated

Erik P. Huyghe, Bradley R. Brodie, DENSO International America Inc.

11:30 a.m.

Test Method for Determining the Annualized Fuel

Kenneth Porrett, General Motors Company

12:00 – 1:30 p.m.

Lunch

12:00 – 3:00 p.m.

Ride 'n Drive

3:00 – 5:30 p.m.

ICCC Standards Meeting

6:00 – 7:00 p.m.

Welcome Reception

TUESDAY

September 27, 2011

Pavilion Room

(continued)

7:00 a.m. – 5:00 p.m.

Registration

7:00 – 8:00 a.m.

Breakfast

8:00 a.m.

Integrated Thermal Management Systems for Vehicles

Hans E H Fernqvist, Volvo Car Corporation

8:30 a.m.

Efficient Climate System using R1234yf

Florian Wieschollek, Visteon Deutschland GmbH; John J. Meyer, Visteon Climate Control

9:00 a.m.

Recent Experiences in MAC System Development

Enrique Peral, Renault

9:40 a.m.

BREAK

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WEDNESDAY

September 28, 2011

Pavilion Room

PROGRAM AGENDA

WEDNESDAY

September 28, 2011
(continued)

10:00 a.m.

Alternative Refrigerants Performance Optimization

Xinzhong Li, Creative Thermal Solutions Inc.

10:30 a.m.

Fully Integrated EV Thermal System and Control Strategies for Maximized Range & Comfort

Rick Rajaie, Magna E-Car Systems

11:00 a.m.

Thermal Management Techniques To Improve Life and Range

John Rugh, National Renewable Energy Lab

11:30 a.m.

Presentation

TBD

12:00 – 1:30 p.m.

Lunch

12:00 – 3:00 p.m.

Ride 'n Drive

3:00 – 5:00 p.m.

OEM Meeting on MAC Fuel Consumption

6:00 – 7:00 p.m.

Reception

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THURSDAY

September 29, 2011
Pavilion Room

7:00 a.m. – 1:00 p.m.

Registration

7:00 – 8:00 a.m.

Breakfast

8:00 a.m.

Distributed Climate System Impact on Human Comfort and MAC Efficiency

Jeffrey Bozeman, Kuo-huey Chen, General Motors Company; Shailendra Kaushik, General Motors Corp.

8:30 a.m.

Relevant MAC Operating Conditions for China and India

Juergen Koehler, University of Braunschweig

9:00 a.m.

Implementation of HFO-1234yf: Guidance on HFO-1234yf Risk Assessments for Alternative Vehicle Types and Service

Christopher Seeton, Honeywell Int'l Inc.; Mark Spatz, Honeywell Int'l Inc.

9:40 a.m.

BREAK

10:00 a.m.

R1234yf Trace Impurities and Their Influence to the Stability of the Refrigerant-Oil System

Ulrich Grimm, Ilk Dresden

10:30 a.m.

Electrical Properties of the Liquid Phase of Refrigerant-Oil Systems

Yvonne Mueller, Ilk Dresden

11:00 a.m.

Comparison of the Permeation of Various Compounds with the Refrigerant HFO-1234yf and HFO-1234yf with ND-8 Oil

Donald G. Bowman, Parker Hannifin Corp.

11:30 a.m.

Heat Transfer Coefficients and Pressure Gradients During Flow Boiling and Condensation for Refrigerant HFO-1234yf

Gursaran D. Mathur, CalsonicKansei North America Inc.

12:00 – 1:30 p.m.

Lunch

12:00 – 3:00 p.m.

Ride 'n Drive

3:00 – 5:00 p.m.

OEM Meeting

THURSDAY

September 29, 2011

(continued)

Yaidi Cancel

Environmental Engineer
US Environmental Protection Agency

Yaidi Cancel graduated from Polytechnic University of Puerto Rico with a B.S. degree in Environmental Engineering and passed the professional engineering licensing examination in 2009. On that same year, she began working for the EPA and has been the technical lead on alternative refrigerants issues for MVACs under SNAP. She is also the MVAC technician certification program manager and lead on MVAC servicing regulations under Section 609 of the Clean Air Act.

Hans E. H. Fernqvist

Technical Expert Climate AC System
Volvo Car Corporation

Hans studied Mechanical Engineering at the Technical University of Chalmers in Gothenburg, Sweden from 1971 – 1975. In 1979 he was employed by Volvo as test engineer to design, built and run various types of strength, fatigue and durability test benches and tests, including AC-compressor testing. He participated in a vehicle workshop for various service and repair jobs, specializing in VW-engine renovations.

Has was appointed *Specialist-Climate System and Components* in 1979 and 2005 appointed *Technical Expert Climate AC System*.

Since 1995 regular member of the SAE Interior Climate Control Standards Committee and have participated in all the SAE CRP activities since 2001.

Ulrich Grimm

Head of New Group Technologies/Materials
Ilk Dresden

Ulrich Grimm is working on interaction between refrigerants, AC lubricants, and materials in AC cycles. As head of the group “New Technologies / Materials” he is dealing with chemical stability of refrigerant-lubricant systems, compatibility with materials in AC cycles, and tribological properties.



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Xinzhong Li, PhD

Manager of Engineering
Creative Thermal Solutions Inc.

Dr. Xinzhong Li has been Manager of Engineering at Creative Thermal Solutions, Inc. (CTS) since 2007. With wide and deep experience and expertise in refrigeration and cryogenics fields obtained at Xi'an Jiaotong University and at ACRC in the University of Illinois at Urbana-Champaign, Dr. Li played an active role at CTS in planning and coordinating research/consulting projects, especially MAC system thermal performance evaluation, component development, low GWP alternate refrigerant evaluation/optimization, and refrigerant emissions at system/component level. He has been the project leader of all SAE CRP programs conducted at CTS including SAE CRP150, CRP1234yf and CRP MRB since 2007.

Xinzhong Li graduated from Xi'an Jiaotong University, Xi'an, China, with BS and MS degrees in 1984 and 1987, respectively. After three years study from 1988 to 1991 in the department of Physics at the Free University Berlin as an exchange PHD student under a China-Germany joint program, Li was awarded PHD degree at his home university in Xi'an in the spring of 1991. Since then, he started his career at the university as a postdoctoral researcher, then an associate professor in 1993, then the department head in 1995 and a professor in 1997. Since 2000, Dr. Li joined ACRC at UIUC, Illinois, as a visiting scholar and then research scientist. At ACRC among other research activities, Dr. Li, acting as member of the expert team, successfully conducted and finished SAE ARCRP and SAE IMAC programs evaluating alternate refrigerants for MAC systems.

Dr. Gursaran D. Mathur, P.E.

Technical Specialist and Development Engineering Manager
CalsonicKansei North America

Dr. Gursaran D. Mathur, P.E., is working as a Technical Specialist and Development Engineering Manager in the area of Automotive Thermal Systems at CalsonicKansei North America, Farmington Hills, MI. His responsibilities at Calsonic Kansei include product design, development and research in the area of automotive thermal systems.


Dr. Mathur's specialization is in the areas of heating ventilating and air conditioning of automotive, residential, and commercial AC systems; Heat Exchangers including internally and externally enhanced surfaces; Two-phase fluid-flow and heat transfer (boiling and condensation); Alternate Refrigerants; Heat recovery systems including two-phase thermosiphon loops and heat pipe heat exchangers; System and component modeling of thermal systems; Experimentation in the HVAC/Thermal systems; and Solar Heating and Cooling.

Dr. Mathur earned his B.S. in Mechanical Engineering from Punjabi University, India; M.S. in Mechanical Engineering (Applied Thermal Science) from Indian Institute of Technology, India; and a Ph.D. in Mechanical Engineering (Refrigeration and Air Conditioning) from University of Windsor, Canada. He has published over 95 technical papers in the area of thermal systems. He is listed as a significant contributor for the ASHRAE Handbooks for 1992, 1996, 2000, 2004, 2007, 2011; and has edited 5 books. He is the past chairman of SAE's technical committee on Thermal Systems Management. He is a registered professional engineer and is a Fellow of SAE, ASHRAE, and ASME.

Yvonne Mueller, PhD

Head of Analytical Group
Ilk Dresden

Dr. Yvonne Mueller is head of the analytical group of the ILK Dresden. She is working in the field of chemical and physical interactions inside AC cycles. She is responsible for the enhancement of analytical methods and supervises the lab work.



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Chris Seeton, PhD

Principal Engineer
Honeywell International, Inc.

Dr. Chris Seeton has been working on advanced automotive AC systems to replace R-134a systems for over 15 years. Joining Honeywell in 2007, his responsibility has been the development of the Low Global Warming molecule HFO-1234yf in all aspects of its application in passenger vehicle air conditioning. Chris has bachelors and masters degrees in Mechanical Engineering from Georgia Tech, and a doctorate of Mechanical Engineering from the University of Illinois at Urbana-Champaign. Dr. Seeton is currently the Technical Leader for Development of HFO-1234yf at Honeywell.

Markus Wawzyniak, PhD

Director Advanced Engineering
Behr GmbH & Co. KG

Dr. Markus Wawzyniak started his studies in Mechanical Engineering at the Ruhr-University Bochum. He obtained both his Masters and Ph.D. degree from Texas A&M University, where he specialized in heat transfer and fluid mechanics. Since joining Behr in 1999, Markus held various engineering management positions both in Germany and the USA. In 2010, Markus was appointed "Director of Advanced Engineering for Air Conditioning" at Behr in Stuttgart, where he is responsible globally for the development of innovative HVAC heat exchangers, modules, and systems, as well as cabin comfort and electronics.

Florian Wieschollek

Manager Refrigerant Cycle and Innovation
Visteon Innovation & Technology GmbH

Florian Wieschollek joined Visteon in May 2000 as systems engineer on automotive climatization. Florian focused on the technical evaluation of alternative refrigerants in several customer and internal projects. Since 2005 he leads the refrigerant cycle and innovation team.

Prior to joining Visteon, Florian worked in the field of development regarding automotive air conditioning components and the research of new refrigerant fluids for six years.

Florian studied at the Universities of Dortmund and Hanover, Germany and the Ecole Supérieure de l'Energie et des Matériaux in Orléans, France. He has a Diploma-Degree as engineer in the field of thermodynamics at the University of Hanover.

Tao Zhan, PhD

Air Resources Engineer
California Air Resources Board

Dr. Tao Zhan obtained his PhD degree in Mechanical Engineering from the University of California at Riverside. He works as an Air Resources Engineer for the California Air Resources Board. He is the agency's lead technical staff on greenhouse gas emissions associated with mobile air conditioning.



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Green Technologies and the Mobility Industry – NEW!

By Dr. Andrew Brown, Jr.

This book features 20 SAE technical papers, originally published in 2009 and 2010, which showcase how the mobility industry is developing greener products and staying responsive – if not ahead of – new

standards and legal requirements. Authored by international experts from both industry and academia, these papers were selected by SAE International's 2010 President Dr. Andrew Brown Jr., Executive Director and Chief Technologist for Delphi Corporation.

Product Code: PT-146; List Price: \$119.95

Available as an  *ebook*




Automotive Air-Conditioning Refrigerant Service Guide

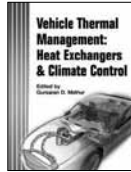
By Philip G. Gott

This second edition was written to provide the latest information to automotive air-conditioning service professionals in order to help them comply with federal certification requirements and prevent

damage to the environment. With an emphasis on proper recovery and recycling techniques for both R-12 and R-134a, the book will serve as a valuable instructional tool and resource for technicians.

Product Code: R-141A; List Price: \$25.00

Available as an  *ebook*



Vehicle Thermal Management: Heat Exchangers and Climate Control

By: Gursaran D. Mathur

To provide customers the level of comfort that they demand in an energy-efficient manner, innovative approaches must be developed. This book is an essential resource for engineers and designers

working on thermal systems, presenting 45 of the most relevant technical papers focusing on this important vehicle component.

Product Code: PT-97; List Price: \$99.95



System Innovation for Sustainability 2

By: Theo Geerken, Mads Borup

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