New California Rules on Mobile Air Conditioning and Their Implication to Service Industry

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California Air Resources Board
Overview

• Background
• Proposed MAC requirements for California Low-Emission Vehicle standards (LEV III)
• Regulation on Small Containers of Automotive Refrigerant
• Summary
MAC Refrigerant Mass Balance

Mass in = Mass out

Initial OEM charge

Recharge:
1) Professional servicing
2) Do-it-yourself

Leakage

Accidental breach

End-of-life

Servicing loss

Container heel

To MAC

To environment

Not addressed
## California Strategies to Reduce MAC GHG Emissions

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<th>In-Use Fleet</th>
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<td><strong>Environmental Performance Label (2007)</strong></td>
<td>Include AC leak test &amp; repair in Smog Check Program</td>
<td>Decommissioned refrigerated shipping containers</td>
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<td><strong>Low-Emission Vehicle Standard, LEV III (2010)</strong></td>
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<td><strong>HD and off-road fleet (Under development by US EPA)</strong></td>
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Planned
Evolution of Vehicle GHG Regulations

CA

2009 MY

AB 1493 (Pavley)

MAC improvements earn credits for GHG emissions

2012 MY

US EPA

Federal Rule

Similar to California AB 1493 approach (credit method) via the ‘Rose Garden Agreement’

2017 MY

LEV III

Mandatory:

• Low GWP refrigerant
• Low leak
• Indirect emissions limit

New Federal Rule to Align with LEV III?

2009 MY

2012 MY

2017 MY
Proposed LEV III MAC Requirement 1: GWP $\leq$ 150 (100% for 2017 MY)

- Provides a nearly 90% direct emission reduction
- Industry can choose from 3 EPA SNAP approved refrigerants (HFC-152a, CO$_2$, and HFO-1234yf)
- New refrigerant may need new service equipment, procedures and certification

GWP: Global Warming Potential
SNAP: Significant New Alternatives Policy
Proposed LEV III AC Requirement 2: Fleet Average Leak Rate $\leq 9$ g/yr

- Low leak rate requirement will help maintain efficiency and reduce maintenance needs
- Potential requirement to ensure adequate lubrication during winter could also reduce maintenance needs
  - Seeking comments: does AC universally operates while defrosting/dehumidifying, thus provide lubrication during winter?
- Low leak rate requirement will accelerate technological transition
  - For AC with belt-driven compressor, 9 g/yr is only achievable by using premium technologies for refrigerant containment (e.g. seal washer as opposed to single o-ring)
  - Electric compressor will likely gain more market share (with growth of hybrid/electric vehicles)
Proposed LEV III MAC Requirement 3: Indirect Emissions Standard

• ARB is proposing to develop a fleet average AC indirect emissions standard

• Stringent indirect emissions standard will accelerate transition to energy saving and efficiency improving technologies (e.g. passive or active parked-car ventilation, variable displacement compressor with external control)

Indirect emissions: tailpipe CO₂ emissions due to mass and operation of AC
Small Containers of Automotive Refrigerant (Small Can) in California

**Annual sales for 2006 in California**
- 2 million cans of HFC-134a sold
- Equivalent to 0.85 MMTCO$_2$E/year
- Price of a typical 12-ounce can is ~$10

**Estimate of small-can use**
- 95% to consumers (equivalent to 0.81 MMTCO$_2$E)
- 5% to professional shops (equivalent to 0.04 MMTCO$_2$E)

12 oz can = 974 Pounds of CO$_2$

~1,000 Miles Driven

1 Barrel of Oil
Three Components of Small Can Regulation

- Self-sealing Valve and Improved Labeling
- Education Program
- Deposit/Return/Recycling Program

- Generally affects containers with less than 2 lbs
- Regulation is effective as of 01/01/2010
  - New cans are going through certification, probably available this summer
  - Old cans have 1-yr sell-through period
• California’s suite of strategies address GHG emissions from MAC’s life span

• California’s next vehicle GHG emission standard for 2017 MY and beyond (part of LEV III) will require new refrigerant, leak rate limit and indirect emissions standard
  – New technical challenges and business opportunities

• New regulation on small cans of automotive refrigerant applies to all end users
  – New cans have self-sealing valves, and improved labels/instructions
  – User pays a deposit upfront, and collects it upon return of used cans
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More about the topic:
http://www.arb.ca.gov/cc/hfc-mac/hfc-mac.htm