An Industry Prepares Service Technicians for Refrigerant Transition

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MACS Field Service Surveys

CFC-12 Fleet
Average Vehicle Life 6-7 years

HFC-134a Fleet
Average Vehicle Life 9+ years

Percent of fleet requiring service within 12 months

Survey Year
1990   36.8%
1991   35.8%
1993   16.6%
1995   15.1%
Retrofit: Lessons Learned
Recovery Recycle Equipment

CFC-12
Clean Air Act Required January 1, 1992

HFC-134a
Clean Air Act Required November 15, 1995
- J2210 Dec. 1991 HFC-134a (R-134a) Recovery/Recycling
- J2788 Dec. 2006 HFC-134a (R-134a) Recovery/Recycling
  To be Published in 2010
- J2788 HFC-134a (R-134a) Recovery/Recycling Equipment and Recovery/Recycling Servicing
  HFC-134a electrical compressors

HFO-1234yf
Clean Air Act Currently Under Review
- To be Published in 2010
- J2843 R-1234yf Recovery/Recycling
Recovering Refrigerant: J2210 Equipment

Normal service

Pre-heat with engine
Recovering Refrigerant: J2210 Equipment

Normal service

Pre-heat with engine

Refrigerant Recovery Single Evaporator OT System
70° F Shop Area Temperature – Time Lapse – Pre-heating
Refrigerant Recovery at Service

SAE J2210
50 - 70%
Refrigerant Recovered

SAE J2788
95%
Refrigerant Recovered

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Resulting Standard
R/R/R Equipment-J2843

J 2843 HFO-1234yf Recovery/Recycling/Recharging Equipment for Flammable Refrigerants for Mobile Air-Conditioning Systems

Highlights

• Machines’ internal components reduce/minimize arcing/sparking
• Machines will have additional cabinet ventilation
• New hose connections will be required with HFO-1234yf (J 639)
• HFO-1234yf refrigerant cylinder color white with red band per J 639
• New equipment will prevent re-charge if system has a leak.
• Machine has 2-step process
  1. Vacuum Check
     • Pull vacuum, check for decays
     • If system decays, will stop machine
  2. Pressure Check
     • If vacuum does not decay, will add 10% charge
     • Monitor pressure, check for pressure decay
     • If the pressure decays, remaining 90% of the refrigerant will not be administered.
Leak Detection Equipment

CFC-12
HFC-134a
- J2791 Jan. 2007 Refrigerant Electronic Leak Detectors, Minimum Performance Criteria

HFO-1234yf
- To be Published in 2010
- J2913 R-1234yf Refrigerant Electronic Leak Detectors, Minimum Performance Criteria
Electronic Leak Detectors

SAE J 1627
14 grams per joint per year
Probe distance at 1/4"
False triggering a problem
Wide range of tool quality under standard

SAE J 2791
4 grams per joint per year
Probe distance at 3/8"
Probe speed increased 50%
False triggering addressed

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Resulting Standard
Field Coupled Hoses

Extreme inconsistency
Both short and long term
Defect potentials
Limited field expertise

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Refrigerant Identification Equipment

- CFC-12
- HFC-134a
- J 1771 Nov. 1998 Criteria for Refrigerant Identification Equipment
- HFO-1234yf
  - To be Published in 2010
- J 2912 R-1234yf Refrigerant Identification Equipment
Technician Service Procedures

CFC-12
- J 1989  Oct.1989 Recommended Service Procedure for the Containment of CFC-12 (R-12)

HFC-134a
- J 2211 Dec. 1991 Recommended Service Procedure for the Containment of HFC-134a (R-134a)

HFO-1234yf
- To be Published in 2010
- J 2845 Technician Training for Safe Service and Containment of Refrigerants Used in Mobile A/ C Systems (R-744, and R-1234yf)
HFO-1234yf SAE Standards
Summary

- How do the standards compare to R-134a?

- Developed new standards in conjunction with refrigerant evaluation, addressing system design, equipment and technicians

- Added 5 new standards
Summary

To prepare for HFO-1234yf service technicians will need:

- New recovery/recycle/recharge or recovery-only equipment
- New refrigerant identifier
- New leak detection equipment
- Assure adequate ventilation and follow flammable storage practices per local, state and federal regulations
- Appropriate technician training