California
Department of Food and Agriculture
Division of Measurement Standards
Petroleum Products Program
Fuels and Lubricants Laboratory

NH3 Fuel Association
The Tenth Annual NH3 Fuel Conference
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Sacramento, California

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Our Mission

The California Department of Food and Agriculture's Division of Measurement Standards (DMS) preserves and defends the standards of weight and measure that provide the basis for value comparison.

DMS ensure fair competition in the marketplace for businesses and accurate commercial transactions for consumers by consistent enforcement of laws and regulations.

Our Organization

- Director
  - Laboratory
    - Fuels and Lubricants
    - Metrology
  - Enforcement
    - Fuels and Lubricant
    - Devices
    - Type Evaluation
    - Price and Quantity Verification
    - Weigh Master
    - Registered Service Agency

DMS LOCATIONS

FUELS AND LUBRICANTS LABORATORY

Laboratories in Sacramento and Anaheim

- Conventional fuels
  - Gasoline
  - Diesel Fuel
- Alternative fuels
  - Biodiesel
  - Ethanol Flex Fuels
  - Methanol Flex Fuels
  - Compressed Natural Gas
  - Liquid Petroleum Gas
  - Hydrogen
- Automotive products
  - Motor oil
  - Gear oil
  - Brake fluid
  - Automotive Transmission Fluids
  - Engine coolants
- Kerosene
- Fuel Oil

DMS Activities in National Consensus Organization

- DMS is part of the National Conference on Weights and Measures (NCWM)
- DMS is active participant in both ASTM D02 and D03 committees for the development of Fuel Standards and Test Methods
- DMS is a member of SAE Hydrogen Fuel Standards Committees
- DMS is a member of the California Fuel Cell Partnership

Hydrogen and Biodiesel Research

- DMS has a 4 million dollar contract with CEC to develop hydrogen dispenser device certification standards, hydrogen quality test methods and test methods for higher level biodiesel blend (>B20)
- DMS developed the hydrogen fuel quality specifications that were the model for most recent version of SAE J2719

DMS's role in Fuel Quality

Within California, DMS maintains and enforces the minimum performance and drivability standards for fuels used in internal combustion engines and fuel cell vehicles.

Additionally, DMS regulates the advertising and labeling of these products to provide valuable information to the consumers.

Laws and Regulations

- The laws relating to motor vehicle fuel were first enacted in 1931 and are found in the California Business and Professions Code (BPC), Division 5, Chapters 14 and 15.
- Regulations that further define and implement the laws are found in the California Code of Regulations (CCR), Title 4, Division 9, Chapters 6, 7, and 8.
- Violations of the petroleum laws are classified as misdemeanors and carry fines of up to $1,000 per violation and/or six months in the county jail.
- http://www.cdfa.ca.gov/dms/

Origin of Authority

The authority for DMS to conduct it's activities originates with the People of the State of California through laws enacted by our elected representatives. Furthermore, DMS develops all regulations with the direct input from all stakeholders. The staff at DMS takes this responsibility vary seriously.

California Law Requires

- All motor vehicle fuel must have a consensus organization fuel quality standard. In absence of such a standard, a user may obtain a “Developmental Engine Fuel Variance” for the purpose of developing a consensus organization standard.
- Devices that measure for purposes of charging are type approved for product delivered and sealed by a Weights and Measure official.
- Fuel dispensers are labeled in accordance to State and Federal requirements.
- Unit of sale must be in dollars per gallon or liter.

What Does DMS Provide?

- Equity in the Market
- Minimum Performance
- Consensus Standards
- Safety
- Value Comparison
- Informed Choices for Consumers

Who are We Protecting?

- The Public
- Consumers
- Distributors
- Producers
- OEM's
- Environment

What Does a New Fuel Need?

- National Consensus Organization Fuel Quality Standard
- Dispenser Type Approvals
- Fuel Labeling Requirements

Fuel Quality Standards

Must be Developed by an ANSI approved Consensus Organization

- ASTM
  - **D02 on Petroleum Products, Liquid Fuels, and Lubricants**
    - David Bradley – dbradley@astm.org
  - **D03 on Gaseous Fuels**
    - Alyson Fick afick@astm.org
- SAE
  - Fuel Cell Standards Committee
    - fuelcells@sae.org

LPG Fuel Quality Standard

D1835 – 11

TABLE 1 Detailed Requirements for Liquefied Petroleum Gases

	Product Type				
	Commercial Propane	Commercial Butane	Commercial PB Mixtures	Special-Duty Propane[A]	ASTM Test Methods (see Section 2)
Vapor pressure at 37.8°C (100°F), max					
kPa	1434	483	[B]	1434	D1267 or D2598 or D6897[C]
psig	208	70	[B]	208	D1267 or D2598 or D6897[C]
Volatile residue:					
evaporated temperature, 95 %, max					
°C	−38.3	2.2	2.2	−38.3	
°F	−37	36	36	−37	D1837
or					
Butane and heavier, max, vol %	2.5	...	...	2.5	D2163
Pentane and heavier, max, vol %	...	2.0	2.0	...	D2163
Propylene content, max, vol %	...	...	...	5.0	D2163
Residual matter:[D]					
Residue on evaporation of 100 mL, max, mL	0.05	0.05	0.05	0.05	D2158
Oil stain observation	pass[E]	pass[E]	pass[E]	pass[E]	D2158
Density at 15°C or relative density at 15.6/15.6°C (60/60°F)	[F]	[F]	[F]	...	D1657 or D2598
Corrosion, copper, strip	No. 1	No. 1	No. 1	No. 1	D1838[G]
Sulfur, mg/kg (ppm mass)	185[H]	140[H]	140[H]	123[H]	D2784 or D6667[I]
Hydrogen sulfide	pass	pass	pass	pass	D2420
Moisture content	pass	...	...	pass	D2713
Free water content	...	none[J]	none[J]	...	...

[A] Equivalent to Propane HD-5 of GPA Standard 2140.

[B] The permissible vapor pressures of products classified as PB mixtures shall not exceed 1430 kPa (208 psig) and additionally shall not exceed that calculated from the following relationship between the observed vapor pressure and the observed relative density:

Ammonia Fuel Quality Standard

- What are the possible fuel uses
  - Spark ignition or compression ignition?
  - Fuel Cell
  - Turbine
  - Boiler
- ASTM Specification can accommodate different grades
- Is there an ISO standard?

Need for Developmental Engine Fuels

The State Recognizes the need for new fuels that do not have a consensus fuel standard. A variance from our laws allow fuels to be used:

- In an experiment with a few vehicles
- Pilot project i.e. one distribution fleet
- Limited fleet or cooperative group i.e. Biodiesel blends >B20
- Develop standards

Developmental Engine Fuel Variance

- Variances may only be granted to provide for the development of information under controlled test conditions to assist in the creation of chemical and performance standards for engine fuels.
- Fuel shall only be distributed or sold to fleet-type centrally fueled vehicle and equipment users.
- Warn all parties of any potential risk
- Report on the progress of the fuel technology evaluation.
- All other requirements, terms, and conditions still apply
- The department expresses no opinion about the fuel
- Damages caused by the fuel are to be addressed by the parties
- The department may withdraw a variance

The Value of the Developmental Engine Fuel Variance

- Allows for data to be collected:
  - To prove the concept
  - To assist with the development of a consensus standard
  - Help gain public confidence with the fuel
  - Develop data need for ARB approvals
  - Demonstrate to others that the fuel can be used in the complex environment that is California

Current Fuel Variances

- Biodiesel Blends greater than 20% being used in many cooperatives.
- Water Emulsified Diesel
- Ethanol Diesel Blends
- Water Ethanol Diesel Blends
- Dimethyl Ether
- CNG due to lack of consensus fuel standard

Dispensing Devices

- Device and Dispensor Type Approvals
  - NIST Handbook 44 list the requirements for Anhydrous Ammonia
- Dispenser Type Approvals Programs
  - NTEP National Type Evaluation Program
    - http://www.ncwm.net/ntep/
  - CTEP California Type Evaluation Program
    - http://www.cdfa.ca.gov/dms/programs/ctep/ctep.html

Anhydrous Ammonia

- As a results of Ammonia's extensive use in Agriculture there are many NTEP or CTEP approved devices
- Handling and Safety concerns are well addressed
- Most Fire Marshall have experience with Ammonia

Do We Need Dispenser Labeling?

California Dispenser Labeling

The price per gallon or liter, including all taxes

The trademark or brand of the motor fuel

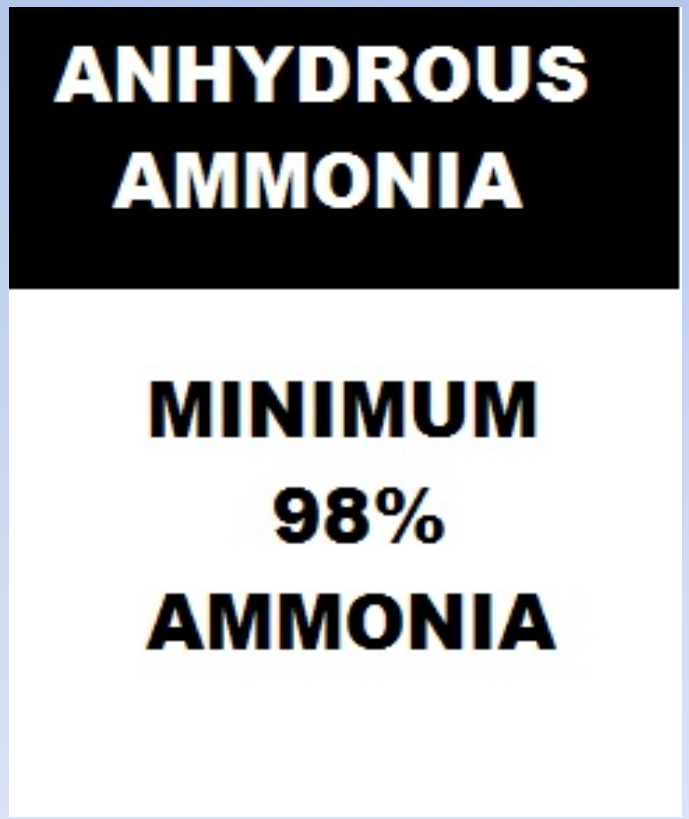
The word “gasoline” or the name of other motor fuels.

The grade designation of the motor fuel

Federal Dispenser Labeling

- Federal Trade Commission requires a minimum uniformity in Fuel Dispenser Labeling
- Alternative Fuels Labels FTC 16 CFR 306

Example of a Federal Label
16 CFR 306.0



How can DMS help?

Provide a developmental engine fuel variance to promote the development of anhydrous ammonia as an fuel for use in internal combustion engines and fuel cells.

Work with Ammonia champions to develop an ASTM fuel specification.

Ensure that industry standards applied across the product and distribution chain

Contact Information

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Questions and Answers