

2024 DLA Energy Worldwide Energy Conference

Diesel Fuel Specifications Update

ASTM Committee D02

Subcommittee E.0

Burner, Diesel and Non-Aviation Gas Turbine Fuels

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Chair, Subcommittee E.0

ASTM Committee D02 SCE.0

Diesel Fuel Specifications Update

- D975 Standard Specification for Diesel Fuel
- D7467 Standard Specification for Diesel Fuel Oil, Biodiesel Blend (B6 to B20)
- D6751 Standard Specification for Biodiesel Fuel Blendstock (B100) for Middle Distillate Fuels
- D975 No. 1 & No. 2 as ISO 8217 DMA Fuel

ASTM D975

- Streamlining ASTM D975 Diesel Fuel & ASTM D7467 Diesel Fuel, B6 to B20
 - Make D975 Tables Easier to Read
 - Dual Standards are Difficult to Maintain in Harmony
 - One Diesel Fuel Standard for Regulators to Follow
 - Utilize Similar Table Formats for Sub E Fuels That Will Essentially Be Interchangeable (D975, D396, D2880)
 - Prepare Standards for Future New Fuels or Blends

ASTM D975

- Lubricity Task Force; Test Method D6079 HFRR
 - Sole Source Equipment
 - TMC Reference Fluids
 - Test Specimens
 - Precision
 - Equivalency Study between PCS and Ducom Test Instrument
- Aromaticity
 - References to EPA
 - Test Methods D5186, D1319,
 - Cetane Index D976 & D4737
 - Appendix on Aromatics

Updated Diesel Definition

3.1.5 diesel fuel, n—liquid specifically designed for injection into a compression-ignition engine to provide energy.

3.1.5.1 Discussion—The liquid is frequently a mixture consisting primarily of hydrocarbons. For D975 compliant diesel fuels, see the section on Alternative Blendstocks for allowed non-hydrocarbon blendstocks.

3.1.5.2 Discussion—A compression-ignition engine is frequently called a diesel engine. In this type of engine, the combustion reactions are initiated when the injected fuel mixes with the hot compressed gases in the combustion zone. There is no spark. The properties of the fuel must support the requirements for compression-ignition engines.

3.1.5.3 Discussion—Blendstocks of varying composition and additives are blended to meet the requirements of relevant specifications, operating conditions (for example, operation at low temperatures), and market needs.

3.1.5.4 Discussion—Many diesel fuels comply with detailed requirements such as are found in regional or national standard specifications. Other liquid fuels are under development for future use in diesel engines and may not comply with any recognized standard.

ASTM D975

- Low Temperature Operability
 - Current 10th % Low Temperature Info is From 1950 to 1970
 - Doner II CRC Data Released in 2018; LT Operability TF Preparing Proposed Updates to Charts and Maps
 - Most Temps Went Up, Some Down, Some No Change
 - Some Original Locations Did Not Have Weather Stations in Doner II
- “Renewable Diesel” = ASTM D975
 - RD is a Hydrocarbon Oil and Must Meet D975
 - No Plans in SCE to Otherwise Classify; OEMs Support RD @ 100%
- Note For All SCE Products:
 - Proficiency Test Program Task Force: Approved at Dec 2023 Meeting; Data Review No. 2D, No. 6 FO, BDB, BD, Cetane, General Gas Oil, Turbine Oil, ULSD

ASTM D7467

- Streamlining ASTM D975 Diesel Fuel & ASTM D7467 Diesel Fuel, B6 to B20

- Grade B6-B20 S15 Requires D6751 Grade S15 LM:

For grade B6-B20 S15 the biodiesel component shall be grade D6751 S15 LM, except as provided in [below]

Grade B6-B20 S15 fuels used in diesel engines that do not have Selective Catalytic Reduction (SCR) or Diesel Particulate Filter (DPF) aftertreatment technology may use biodiesel meeting grades ASTM D6751 S15 or S15 LM.

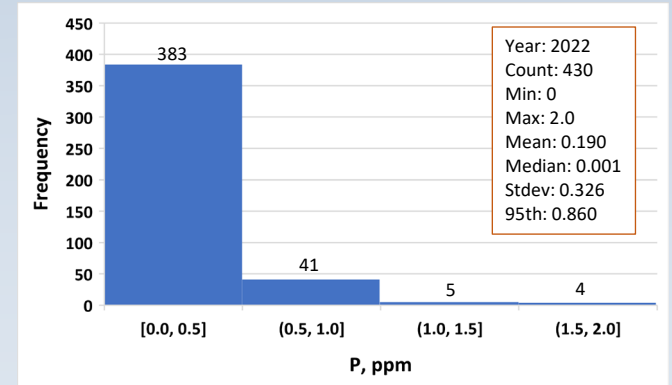
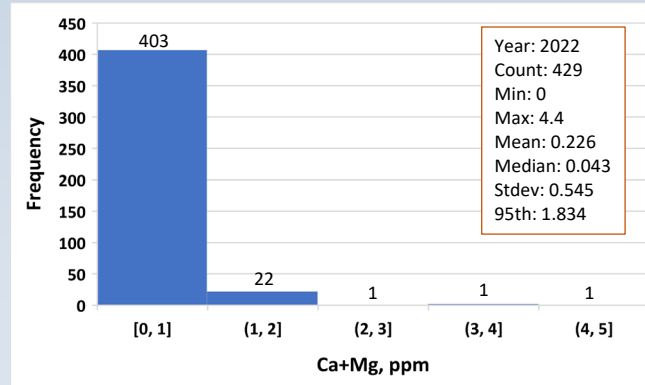
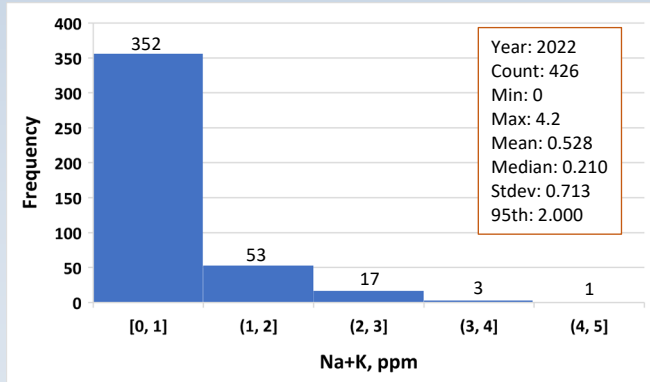
- Higher Level Biodiesel Blends for Finished Fuel, up to B100

ASTM D6751

- Cetane No.: 47 to 45
- Low Metal Grades Introduced:
 - Na+K+Ca+Mg Combined 4 ppm max for Grades 1B S15 LM and 2B S15 LM
 - ◆ Na or K common catalysts in BD Production
 - ◆ Ca or Mg may be in wash water
 - Other Grades (Non LM) Remains Max: Ca+Mg 5 ppm; Na+K 5 ppm
- P levels being investigated; current spec is 10 ppm max; market values are <<10 ppm.
 - Should the spec for P be lowered for ULEDE engines?
 - Can we get a better STM with lower LOD and LOQ at ASTM (Improved ICP-OES)?
- D6751 Recognized by ASTM International as one of eight standards throughout all of ASTM as being one of the most influential standards in the 125 year history of the organization

CFAA / NREL Annual BD Quality Survey

- Conducted annually since 2018; roughly covering 92% of biodiesel industry production
- 2022 Data Key Findings:
 - Metals (Na + K + Ca + Mg) generally well below 1 ppm
 - Phosphorus generally below 0.5 ppm



ASTM D975 v. ISO 8217 DMA

Property	ASTM Specified Test Method	ASTM D975 Grades						ISO 8217 Grade DMA	ISO Specified Test Method
		No. 1-D S15	No. 1-D S500	No. 1-D S5000	No. 2-D S15	No. 2-D S500	No. 2-D S5000		
Flash Point, °C, min.	D93	38			52			60.0	ISO 2719
Water and Sediment, percent volume, max	D2709	0.05						---	---
Distillation Temperature, °C 90 %, percent volume recovered	D86							---	---
min		---			282			---	---
max		288			338			---	---
Kinematic Viscosity, mm ² /S at 40 °C	D445								ISO 3104
min		1.3			1.9			2.000	
max	...	2.4			4.1			6.000	
Ash percent mass, max	D482	0.01						0.010	ISO 6245
Sulfur, ppm (µg/g) max	D5453	15	15		
percent mass, max	D2622	...	0.05	0.50	...	0.05	0.50	Per Statutory	ISO 8754, ISO 14596, ASTM D4294
Copper strip corrosion rating, max (3 h at a minimum control temperature of 50 °C)	D130	No. 3							

ASTM D975 v. ISO 8217 DMA

Property	ASTM Specified Test Method	ASTM D975 Grades						ISO 8217 Grade	ISO Specified Test Method
		No. 1-D S15	No. 1-D S500	No. 1-D S5000	No. 2-D S15	No. 2-D S500	No. 2-D S5000	DMA	
Cetane number, min	D613	40.						---	---
In the United States, one of the following properties shall be met:									
(1) Cetane index, min.	D976/D4737	40.						40.0	ISO 4264
(2) Aromaticity, percent volume, max	D1319/D5186	35	35	...			
Operability Requirements		Report						Report	
Cloud point, °C, max or	D2500								ISO 3015
LTFT/CFPP, °C, max	D4539/D6371								CFPP Only; EN116 or EN16329
Ramsbottom carbon residue on 10 % distillation residue, percent mass, max	D524	0.15			0.35				
Carbon Residue on 10% vol distillation residue, micro, percent mass, max	---	---						0.30	ISO 103700

ASTM D975 v. ISO 8217 DMA

Property	ASTM Specified Test Method	ASTM D975 Grades						ISO 8217 Grade DMA	ISO Specified Test Method
		No. 1-D S15	No. 1-D S500	No. 1-D S5000	No. 2-D S15	No. 2-D S500	No. 2-D S5000		
Lubricity HFRR @ 60 °C, micron, max	D6079/D7688			520				520	ISO-12156-1
Conductivity, pS/m or Conductivity Units (C.U.), min	D2624/D4308			25					
FAME, percent volume	D7371/ D7861/EN 14078			5				de minimus	ASTM D7963 or EN-1407 / ASTM D7371
Density @ 15 °C, kg/m ³ max				—				890.00	ISO-3675 or ISO-12185
Hydrogen Sulfide, mg/kg max				—				2.00	IP570
Acid Number, mg KOH/g, max				—				0.5*	ASTM D664*
								*ASTM D7467, max 0.3	
Pour Point (Upper), °C, max									
Winter				—				-6	ISO-3016
Summer				—				0	
Appearance (Workmanship)	D4176	Visually free undissolved water, sediment, and suspended matter; free of adulterant or contaminant						Clear & Bright – test for water 200 mg/kg max	Visual / ISO 12937

Questions?

Thank you!

R Jennings