Certified Reference Standards

BioFuels

2009 Update

Glycerin

FAME Mixtures

FAEE Mixtures

Sulfur Standards

Physical Standards

Wear Metals

ASTM & EN Method Standards

Custom Formulations

BioFuels

AccuStandard

ASTM, EN and other test methods have been developed to monitor the properties (physical and chemical), constituent distribution, impurities and suitability of use.

The source materials that are used to produce these fuels vary from plant oils, ethyl alcohol (usually from corn) and even waste products.

Biodiesel refineries have opened all over the world.

- The Minister for the Environment and Heritage of Australia has signed the Fuel Standard (Biodiesel) in 2006 which sets out the physical and chemical parameters with the associated test methods to determine compliance.
- In Germany the sale of biodiesel in gas stations is over 2 million cubic meters.
- In the USA, some state legislatures have mandated 2% biodiesel content in all diesels sold in those states.

ASTM D6584 & EN 14105 Free and Total Glycerin in Biodiesel by GC

Compound	Qty./Conc.		Matrix	Cat. No.	Unit
Glycerin	0.5	mg/mL	Pyridine	BF-D-6584-01	2 mL
Monoolein	5	mg/mL	Pyridine	BF-D-6584-02	2 mL
1,3-Diolein	5	mg/mL	Pyridine	BF-D-6584-03	2 mL
Triolein	5	mg/mL	Pyridine	BF-D-6584-04	2 mL
(S)-(-)-1,2,4-Butanetriol	1	mg/mL	Pyridine	BF-D-6584-05-IS	5 mL
Tricaprin	8	mg/mL	Pyridine	BF-D-6584-06	5 mL
MSTFA	5	mL	Neat	BF-D-6584-07N	5 mL
SET of 7 above compounds				**BF-D-6584-SET**	**7 units**
Mix of above compounds, on right (MSTFA separate)					
Biofuel 20	0.5	mg/mL	CH_2Cl_2	BF-FU-030-D	2 mL
Biofuel 20	20	mg/mL	CH_2Cl_2	BF-FU-030-D-40X	2 mL
Biofuel 100 Consumer grade	0.5	mg/mL	CH_2Cl_2	BF-FU-029-D	2 mL
Biofuel 100 Consumer grade	20	mg/mL	CH_2Cl_2	BF-FU-029-40X	2 mL
Biofuel 100	0.5	mg/mL	CH_2Cl_2	BF-FU-032-D	2 mL
Biofuel 100	20	mg/mL	CH_2Cl_2	BF-FU-032-D-40X	2 mL

ASTM D6584 Mixture

BF-D-6584-MIX **1 mL**
At stated conc. in Pyridine 6 comps.

Glycerol	0.5 mg/mL
Monoolein	5 mg/mL
1,3-Diolein	5 mg/mL
Trioctadecenoin (Olein)	5 mg/mL
(S)-(-)-1,2,4-Butanetriol	1 mg/mL
Tricaprin	8 mg/mL

Note: MSTFA (BF-D-6584-07N) can be ordered separately.

EN 14103 Fatty Acid Methyl Esters (FAMEs)

The methyl esters in the mixture are those derived from typical glycerides present in biomass sources.

Soy & Corn

BF-SOY-ME	**100 mg**
16:0 Palmitate	6% Wt.
18:0 Stearate	3% Wt.
20:0 Arachidate	3% Wt.
18:1 Oleate	35% Wt.
18:2 Linoleate	50% Wt.
18:3 Linolenate	3% Wt.

Rapeseed Oil

BF-RAP-ME	**100 mg**
14:0 Myristate	1% Wt.
16:0 Palmitate	4% Wt.
18:0 Stearate	3% Wt.
20:0 Arachidate	3% Wt.
22:0 Behenate	3% Wt.
24:0 Lignocerate	3% Wt.
18:1 Oleate	60% Wt.
22:1 Erucate	5% Wt.
18:2 Linoleate	12% Wt.
18:3 Linolenate	5% Wt.
20:1 Eicosenoate	1% Wt.

Palm Kernel

BF-PALM-ME	**100 mg**
8:0 Caprylate	7% Wt.
10:0 Caprate	5% Wt.
12:0 Laurate	48% Wt.
14:0 Myristate	15% Wt.
16:0 Palmitate	7% Wt.
18:0 Stearate	3% Wt.
18:1 Oleate	12% Wt.
18:2 Linoleate	3% Wt.

Beef Tallow & Palm Oil

BF-BT-ME	**100 mg**
14:0 Myristate	2% Wt.
16:0 Palmitate	30% Wt.
16:1 Palmitoleate	3% Wt.
18:0 Stearate	14% Wt.
18:1 Oleate	41% Wt.
18:2 Linoleate	7% Wt.
18:3 Linolenate	3% Wt.

Fat and oil derivatives (FAME)
Determination of MeOH Content.

Percent Methanol Calibration Standard Set

BF-MEOH-SET **5 x 1 mL**

BF-MEOH-1X	100 µg/g
BF-MEOH-5X	500 µg/g
BF-MEOH-10X	1000 µg/g
BF-MEOH-25X	2500 µg/g
BF-MEOH-50X	5000 µg/g

Methanol *in Water*

Individual Mixes packaged under Nitrogen for stability

The Future
Algae, as a biofuel feedstock, yields energy balances higher than even soybeans. (source: "Widescale Biodiesel Production from Algae", Briggs, Michael, University of New Hampshire Biodiesel Group, UNH (revised August 2004) page 8.

Full Circle
"Liquid biofuels have been used since the early days of the car industry. Nikolaus August Otto, the German inventor of the combustion engine, conceived his invention to run on ethanol. Rudolf Diesel, the German inventor of the Diesel engine, designed it to run on peanut oil. Henry Ford originally designed the Ford Model T, a car produced from 1903 to 1926, to run completely on ethanol." (source: http://en.wikipedia.org/wiki/Biofuel Retrieved 8/31/2007).

Fatty Acid Ethyl Esters (FAEEs)

Ethyl Esters in Soy & Corn

BF-SOY-EE	100 mg
16:0 Ethyl palmitate	6% Wt.
18:0 Ethyl stearate	3% Wt.
20:0 Ethyl arachidate	3% Wt.
18:1 Ethyl oleate	35% Wt.
18:2 Ethyl linoleate	50% Wt.
18:3 Ethyl linolenate	3% Wt.

Ethyl Esters in Rapeseed Oil

BF-RAP-EE	100 mg
14:0 Ethyl myristate	1% Wt.
16:0 Ethyl palmitate	4% Wt.
18:0 Ethyl stearate	3% Wt.
20:0 Ethyl arachidate	3% Wt.
22:0 Ethyl behenate	3% Wt.
24:0 Ethyl lignocerate	3% Wt.
18:1 Ethyl oleate	60% Wt.
22:1 Ethyl erucate	5% Wt.
18:2 Ethyl linoleate	12% Wt.
18:3 Ethyl linolenate	5% Wt.
20:1 Ethyl eicosenoate	1% Wt

Ethyl Esters in Palm Kernel Oil

BF-PALM-EE	100 mg
8:0 Ethyl caprylate	7% Wt.
10:0 Ethyl caprate	5% Wt.
12:0 Ethyl laurate	48% Wt.
14:0 Ethyl myristate	15% Wt.
16:0 Ethyl palmitate	7% Wt.
18:0 Ethyl stearate	3% Wt.
18:1 Ethyl oleate	12% Wt.
18:2 Ethyl linoleate	3% Wt.

Ethyl Esters in Beef Tallow

BF-BT-EE	100 mg
14:0 Ethyl myristate	2% Wt.
16:0 Ethyl palmitate	30% Wt.
16:1 Ethyl palmitoleate	3% Wt.
18:0 Ethyl stearate	14% Wt.
18:1 Ethyl oleate	41% Wt.
18:2 Ethyl linoleate	7% Wt.
18:3 Ethyl linolenate	3% Wt.

All neats are 100 mg. All solutions are 1 mL of 10 mg/mL concentration in Hexane as a solvent.

Compound	Neats	Solutions
Ethyl palmitate (16:0)	FAEE-006N	FAEE-006S
Ethyl stearate (18:0)	FAEE-007N	FAEE-007S
Ethyl arachidate (20:0)	FAEE-008N	FAEE-008S
Ethyl oleate (18:1)	FAEE-014N	FAEE-014S
Ethyl linoleate (18:2)	FAEE-012N	FAEE-012S
Ethyl linolenate (18:3)	FAEE-016N	FAEE-016S
Ethyl myristate (14:0)	FAEE-005N	FAEE-005S
Ethyl behenate (22:0)	FAEE-009N	FAEE-009S

Compound	Neats	Solutions
Ethyl lignocerate (24:0)	FAEE-010N	FAEE-010S
Ethyl erucate (22:1)	FAEE-011N	FAEE-011S
Ethyl caprylate (8:0)	FAEE-002N	FAEE-002S
Ethyl caprate (10:0)	FAEE-003N	FAEE-003S
Ethyl laurate (12:0)	FAEE-004N	FAEE-004S
Ethyl palmitoleate (16:1)	FAEE-001N	FAEE-001S
Ethyl nervonate (24:1)	FAEE-013N	FAEE-013S
Ethyl heptadecanoate (17:0)	FAEE-015N	FAEE-015S
Ethyl linolenate (gamma) (18:3)	FAEE-020N	FAEE-020S

ASTM D6751-06 & ASTM D5453 Sulfur as Di-n-butyl sulfide in Biodiesel

Each is in a 100 mL bottle.

Compound	ppm (µg/g)	% w/w	Matrix	Cat. No.
Sulfur in B5	0	0	B5	BF-5453-B5-BL
Sulfur in B5	5	0.0005	B5	BF-5453-B5-5X-SET
Sulfur in B5	10	0.001	B5	BF-5453-B5-10X-SET
Sulfur in B5	15	0.0015	B5	BF-5453-B5-15X-SET
Sulfur in B5	30	0.003	B5	BF-5453-B5-30X
Sulfur in B5	50	0.005	B5	BF-5453-B5-50X
Sulfur in B5	75	0.007	B5	BF-5453-B5-75X
Sulfur in B5	100	0.01	B5	BF-5453-B5-100X
Sulfur in B5	200	0.02	B5	BF-5453-B5-200X
Sulfur in B5	500	0.05	B5	BF-5453-B5-500X
Sulfur in B20	0	0	B20	BF-5453-B20-BL
Sulfur in B20	5	0.0005	B20	BF-5453-B20-5X-SET
Sulfur in B20	10	0.001	B20	BF-5453-B20-10X-SET
Sulfur in B20	15	0.0015	B20	BF-5453-B20-15X-SET
Sulfur in B20	30	0.003	B20	BF-5453-B20-30X
Sulfur in B20	50	0.005	B20	BF-5453-B20-50X
Sulfur in B20	75	0.007	B20	BF-5453-B20-75X
Sulfur in B20	100	0.01	B20	BF-5453-B20-100X
Sulfur in B20	200	0.02	B20	BF-5453-B20-200X
Sulfur in B20	500	0.05	B20	BF-5453-B20-500X
Sulfur in B100	0	0	B100	BF-5453-B100-BL
Sulfur in B100	5	0.0005	B100	BF-5453-B100-5X-SET
Sulfur in B100	10	0.001	B100	BF-5453-B100-10X-SET
Sulfur in B100	15	0.0015	B100	BF-5453-B100-15X-SET
Sulfur in B100	30	0.003	B100	BF-5453-B100-30X
Sulfur in B100	50	0.005	B100	BF-5453-B100-50X
Sulfur in B100	75	0.007	B100	BF-5453-B100-75X
Sulfur in B100	100	0.01	B100	BF-5453-B100-100X
Sulfur in B100	200	0.02	B100	BF-5453-B100-200X
Sulfur in B100	500	0.05	B100	BF-5453-B100-500X

Note: 10,000 ppm = 1% Wt.

Example: 0.0005 % w/w standard = 5 ppm

Technical Note

The 5, 10 and 15 ppm sulfurs are supplied as a set including a blank.

AccuStandard suggests using the blank for analysis to compensate for matrix interferences, such as low levels of native sulfur.

Physical Standards

Compound	Conc.		Matrix	Cat. No.	Unit
ASTM D2500					
Cloud Point	TBD *	ºC	B5	BF-D-2500-B5	200 mL
	TBD *	ºC	B20	BF-D-2500-B20	200 mL
	TBD *	ºC	B100	BF-D-2500-B100	200 mL
ASTM D93 / EN-ISO 3679					
Flash Point	60	ºC		BF-D-93-60C	200 mL
	65	ºC		BF-D-93-65C	200 mL
	140	ºC		BF-D-93-140C	200 mL
ASTM D4951 / EN 14107					
Phosphorus Content	0.001	% w/w	B100	BF-D-4951-B100	100 g
ASTM D6304 / EN ISO 12937					
(KF) Water Content	60	µg/g		BF-KF-0.6X-5ML-VAP	10 x 5 mL
	100	µg/g		BF-KF-1X-5ML-VAP	10 x 5 mL
	1000	µg/g		BF-KF-10X-5ML-VAP	10 x 5 mL
	5000	µg/g		BF-KF-50X-5ML-VAP	10 x 5 mL
ASTM D6751 / UOP 391 / EN 14108 / EN 14109					
Sodium / Potassium	100	ppm	B100	BF-UOP-391-B100	100 g
EN 14538					
Calcium / Magnesium	100	ppm	B100	BF-14538-B100	100 g

* TBD - These values will be certified on the individual lots and may vary between lots.

Note: All products are Refinery grade stock, unless specifically marked Consumer grade.

EN 14214 Wear Metals

Each is 100 grams at 500 µg/g concentration.

Compound	Matrix	Cat. No.
Aluminum	B100	BF-WM-B100-01-0.5X
Calcium	B100	BF-WM-B100-09-0.5X
Chromium	B100	BF-WM-B100-13-0.5X
Copper	B100	BF-WM-B100-15-0.5X
Iron	B100	BF-WM-B100-27-0.5X
Lead	B100	BF-WM-B100-29-0.5X

Compound	Matrix	Cat. No.
Magnesium	B100	BF-WM-B100-32-0.5X
Phosphorus	B100	BF-WM-B100-41-0.5X
Potassium	B100	BF-WM-B100-43-0.5X
Sodium	B100	BF-WM-B100-54-0.5X
Zinc	B100	BF-WM-B100-70-0.5X

Biofuel Blank

B100

BF-WM-B100-BL-1 **100 g**
BF-WM-B100-BL-5 **500 g**

Biofuel Metals Mix

NEW

Multi-Element Biofuel Standard

BF-WM-B100-MIX1 **100 g**
200 µg/g each in B100 5 comps.

Ca (Calcium)
K (Potassium)
Mg (Magnesium)
Na (Sodium)
P (Phosphorus)

Formulations for EN 12916, Aromatic Hydrocarbons in Middle Distillates, other methods and custom formulations are available.

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