

Biofuels

Biodiesel

Methods - Equipment - Supplies



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ASTM D6751 – Biodiesel Fuel Blend Stock (B100) for Middle Distillate Fuels

Biodiesel fuel blend stock (B100) is comprised of mono-alkyl esters of long chain fatty acids derived from vegetable oils or animal fats. Biodiesel fuel is normally produced from a reaction between vegetable oil or animal fat and methanol or ethanol in the presence of a catalyst to produce mono-alkyl esters and glycerin, which is removed. The biodiesel product attributes approximately 10% of its mass from the reacted alcohol.

For biodiesel fuels to conform to the specifications of ASTM D6751, they are required to pass the following test methods. Click the test methods below for more information.

- [ASTM D93](#) Flash Point by Pensky-Martens Closed Cup Tester
- [ASTM D2709](#) Water and Sediment in Middle Distillate Fuels by Centrifuge
- [ASTM D445](#) Kinematic Viscosity of Transparent and Opaque Liquids
- [ASTM D874](#) Sulfated Ash from Lubricating Oils and Additives
- [ASTM D130](#) Corrosiveness to Copper from Petroleum Products by Copper Strip Test
- [ASTM D2500](#) Cloud Point of Petroleum Products
- [ASTM D664](#) Acid Number of Petroleum Products by Potentiometric Titration
- [ASTM D4530](#) Determination of Carbon Residue (Micro Method)
- [ASTM 6584](#) Determination of Total and Free Glycerin in B100 Biodiesel Methyl Esters by Gas Chromatography
- [ASTM D1160](#) Distillation of Petroleum Products at Reduced Pressure
- [ASTM D7501](#) Determination of Fuel Filter Blocking Potential of Biodiesel Blend Stock by Cold Soak Filtration Test
- [EN 15751](#) Determination of Oxidation Stability by Accelerated Oxidation Method
- [ASTM D5453](#) Determination of Total Sulfur by Ultraviolet Fluorescence
- [ASTM D613](#) Cetane Number of Diesel Fuel Oil
- [ASTM D4951](#) Phosphorus Additives by Inductively Coupled Plasma Atomic Emission Spectrometry
- [EN 14538](#) Determination of Calcium, Potassium, Magnesium and Sodium Content by Optical Emission Spectral Analysis with Inductively Coupled Plasma



[Click here](#) to see

ASTM D7467 – Biodiesel Blend Test Methods & Products



[Click here](#) to see

Lab Equipment & Supplies

- Lab supplies
- Electrochemistry
- Fluid handling
- Equipment and Instrumentation

ASTM D93 – Flash Point by Pensky-Martens Closed Cup Tester

Determines the flash point of biodiesel samples within the temperature range of 140 to 374°F (60 to 190°C). Pensky-Martens Closed Cup Flash Tester determines the ignition point of fuels with a closed cup method by stirring the sample with two speed options. Flash point tests are used in shipping and safety regulations for detecting contaminants by volatile and flammable materials in biofuel samples.

Flash point: The lowest temperature at which the vapors of a sample ignite.



Pensky-Martens flash point tester 59871-00 shown with motor 59871-50

Manual Flash Point Testers

Adjustable heater provides excellent accuracy

Pensky-Martens closed-cup flash testers are used to determine the flash point of fuels, lubricating oils, liquids containing suspended solids, and liquids that tend to form a surface film during testing.

They feature a cover that slides the shutter open to apply test flame. Select from electrical or gas heated models. Electrical models are equipped with a 750 watt nickel-chromium heater. Gas model has a built-in nickel-plated brass natural gas burner and liquid propane burner mounted on a cast iron base.

What's included: thermometer holder, brass test cup with handle, pilot flame, test flame reference bead, built-in stirrer, plated brass thermometer ferrule, and cooling vents. Order stirrer motor separately below.

Catalog number	ASTM method	Power (50/60 Hz)	Dimensions (L x W x H)	Price
GP-59871-00	D93	115 VAC	9½" x 8" x 22½" (24.1 x 20.3 x 57.2 cm)	
GP-59871-05		220 VAC		
GP-59871-07		Gas heated		

[GP-59871-50](#) **Stirrer motor** for Pensky-Martens tester. Slow-speed motor rotates stirrer at 115 rpm. Features adjustable support bracket and rod. Installs in base of flash tester. 115 VAC, 50/60 Hz operation

[GP-59871-51](#) **Stirrer motor** for 230 VAC, 50 Hz operation

MORE information!

These manual flash point testers are also required for testing **ASTM D7467 – Diesel Fuel Oil, Biodiesel Blend (B6 to B20)**.



For this test method, you may also need . . .



[GP-08009-07](#) ASTM glass thermometer, 23 to 230°F (-5 to 110°C)



[Toluene](#)



[Acetone](#)

ASTM D2709 – Water and Sediment in Middle Distillate Fuels by Centrifuge

Centrifugation provides a means of determining the volume of water content and sediment in a sample of biodiesel with viscosity between 1.0 to 4.1 mm²/s (1.0 to 4.1 cSt) and densities between 770 to 900 kg/m³ at 104°F (40°C). The Automatic Heated Oil Test Centrifuge separates the layers of the biodiesel sample by density to determine the amount of water content and sediment within the sample. High volumes of water in the oil have the potential to cause system corrosion. Sediment in the oil obstructs the flow of the biodiesel.



Koehler Automatic Heated Oil Test Centrifuges

Fully automatic benchtop unit is designed expressly for petroleum testing applications

- Automatic control of acceleration ramp, centrifugation speed, and timing functions
- Doubly insulated to reduce heat loss and increase reproducibility
- Sliding stainless steel lid with large clear top to view your samples
- Group D, Class 1, Division 2 explosion-resistant rating

This oil test centrifuge is used for water and sediment determination and is fully automated. Use the integrated 4½" touch-screen control panel to set test duration, the RCF and rpm values, and choose your specific rotor assembly and its corresponding glassware. You may set the unit to your desired speed. Quiet running unit features an elastic suspension of the drive motor for self-balancing operation. The operating speed will remain constant due to the voltage compensated circuitry in the event of voltage fluctuations.

Molded PTFE cushions provide excellent chemical resistance, ease of tube positioning, and longevity of your unit. View your samples while they are spinning from the clear 18½" viewing window on the top of the lid. The lid allows easy access to the rotor and tube holders for easy cleaning. Unit is equipped with a safety lockout mechanism and automatic electronic braking system.

What's included: rotor assembly and power cord.

Required System Components

- 1 Centrifuge with rotor assembly
- 2 Centrifuge tube(s)



17300-01



Specifications

Capacity: four oil test centrifuge tubes (order separately)

Maximum speed: 2200 rpm

Set speed: 500 to 2200 rpm

Temperature control: ambient to 200°F (93°C)

Temperature readout: digital

Timer: 0 to 999 min

Dimensions (L x W x H): 31" x 25¾" x 14¾"
(78.7 x 65.5 x 36.3 cm)

Shpg wt: 122 lb (55.4 kg)

1 Automated Heated Oil Test Centrifuges

Catalog number	Rotor (included) for tube type	Max RCF x g	Power		Price
			VAC	Hz	
GP-17300-01	Cone/long (100 mL)	1327	115	60	
GP-17300-03			230	50/60	
GP-17300-09	Pear (100 mL)	865	115	60	
GP-17300-11			230	50/60	

2 Tubes

Catalog number	Description	ASTM method(s)	Price
GP-17300-33	Cone/long, 100 mL; with capillary tip capable of measuring 0.01 mL	D2273, D2709	
GP-17300-51	Pear; 100 mL with tube tip having graduations of 0.01 mL over the range 0 to 0.2 mL	D2709	

[GP-17300-37](#) PTFE cushion, required for cone tube with capillary tip

[GP-17300-53](#) Cork stopper for pear tubes

MORE information!

These automated heated oil test centrifuges are also required for testing **ASTM D7467 – Diesel Fuel Oil, Biodiesel Blend (B6 to B20).**



ASTM D445 – Kinematic Viscosity of Transparent and Opaque Liquids (and Calculation of Dynamic Viscosity)

Kinematic viscosity is determined by measuring the time it takes for a sample to flow through a glass capillary viscometer. Calibrated Capillary Viscometers are used to measure flow under gravity or vacuum at precisely controlled temperatures. The viscosity of the fuel is important for determining the appropriate storage and operational conditions.

Kinematic viscosity: The resistance of a fluid to flow under gravity.

Dynamic viscosity: The ratio between the applied shear stress and rate of shear of a liquid; a measure of the resistance to the flow of liquid.

Constant-Temperature Viscosity Baths

Save time—seven viscometer holders and seven bath timers allow multiple measurements at the same time

- Motorized stirrer provides uniform temperature control, thorough circulation without turbulence

Baths feature PID microprocessor controller to deliver precise temperature control, with ASTM specified tolerances throughout the operating temperature range. Dual digital displays show set point time and actual temperature. Timers display in 0.01-second resolution and have $\pm 0.01\%$ accuracy.

Models with RS-232 port also allow you to enter the viscosity constant of each viscometer on the controller panel. Controller automatically displays test results in efflux time and viscosity units when timers stop.

Controller automatically shuts off power when there is an overtemperature condition or if the primary probe is disconnected.

The integrated low-level sensor interrupts operations if the bath liquid does not fill to the proper level, and shuts off power if the liquid falls below the level.

Bath chamber is a clear Pyrex® tank enclosed in a polyester-epoxy finished steel housing. Top plate holds the viscometers and is made of stainless steel for easy cleaning. Front viewing window reduces distortion. Glare-free fluorescent lights in the bath and a background baffle enhance the view of the viscometers. Baths rest on adjustable leveling feet.

What's included: circulator, controller, cooling coil, bath chamber, top plate, thermometer holder, seven plastic holder covers, and 6-ft cord with plug (US standard for 115 VAC, European for 230 VAC).



98944-00

Specifications

Temperature resolution: 0.1°F/°C	Temperature sensor: 100 Ω Pt RTD	High-temperature cutoff: adjustable within range	Wetted materials: stainless steel, glass	Bath depth 22-L models: 12" 34-L models: 18"	Dimensions 22-L models: 20"L x 15"W x 24"H (50.8 x 38.1 x 61 cm) 34-L models: 20"L x 15"W x 31"H (50.8 x 38.1 x 78.7 cm)
Temperature control: PID microprocessor	Display: LCD	Viscometer ports: seven, 2" dia	Bath medium: deionized water, white mineral oil, or silicon fluid		

Catalog number	Bath capacity (L/gal)	Temperature range	Accuracy	Output	Power (VAC, Hz)	Price
GP-98944-00	22 L (5.8 gal.)	Ambient to 302°F (150°C) -4 to ambient with external chiller (not included)	Exceeds ASTM standards	—	115, 60	
GP-98944-05				RS-232	230, 50	
GP-98944-10					115, 60	
GP-98944-15	34 L (8.9 gal.)	Ambient to 302°F (150°C) -4 to ambient with external chiller (not included)	Exceeds ASTM standards	—	115, 60	
GP-98944-20				RS-232	230, 50	
GP-98944-25					115, 60	
GP-98944-30					230, 50	
GP-98944-35					115, 60	

[GP-98934-51](#) Glass capillary viscometer, size #50

[GP-98934-52](#) Glass capillary viscometer, size #75

[GP-98934-53](#) Glass capillary viscometer, size #100

[GP-98934-90](#) Plastic viscometer holder

[GP-98934-91](#) Neoprene viscometer holder

[GP-98934-98](#) Brass viscometer holder

For this test method, you may also need . . .



[Viscosity standards](#)



[Chromic acid cleaning solution](#)



[Petroleum naphtha](#)



[Acetone](#)

ASTM D874 – Sulfated Ash from Lubricating Oils and Additives

Determines the amount of ash by burning the sample using an Ashing Furnace until only ash and carbon are left. The residue is treated with sulfuric acid and reheated until the carbon oxidizes, then retreated with sulfuric acid and heated to constant weight. Ash-forming materials may be present in biodiesel in three forms: abrasive solids, soluble metallic soaps, and unremoved catalysts. Abrasive solids and unremoved catalysts can contribute to injector, fuel pump, piston and ring wear, and also to engine deposits. Soluble metallic soaps have little effect on wear but may contribute to filter plugging and engine deposits.

Sulfated ash: The residue remaining after a biodiesel sample is carbonized and treated with sulfuric acid and heated to a constant weight.



Programmable Ashing Furnaces

Conforms to ASTM specifications D874, D482, and D5184

- Ideal for determining amount of ash in petroleum products
- Maximum temperature of 2012°F (1100°C)

Determine the amount of ash in distillate and residual fuels, gas turbine fuels, crude oils, lubricating oils, waxes, and other petroleum products with this ashing furnace. The digital PID control accurately maintains temperature settings. A special air intake and exhaust system provides six air exchanges every minute while incoming air is preheated to ensure good temperature uniformity. Control panel allows you to store up to nine different programs and contains an integrated timer.

Double-walled stainless steel housing provides stability and a low external temperature. Highly durable, cured vacuum fiber module lining offers excellent temperature distribution. Oven is heated from two sides by ceramic heating plates with integrated heating elements that remain safe from fumes and splashing. Solid-state relays help provide low-noise operation.

What's included: power cord.



33859-12

Specifications

Temperature range: ambient to 2012°F (1100°C)

Temperature stability: ±3°C

Temperature control accuracy: ±3°C

Catalog number	Capacity cu ft (L)	Dimensions (W x H x D)		Rise time	Air exchange rate	Power		Shpg wt lb (kg)	Price
		Chamber	Overall			VAC, Hz	Watts		
Drop-down door									
GP-33859-10	0.47 (13.3)	9" x 6¾" x 13¾" (23 x 17 x 34 cm)	19" x 35½" x 25½" (48 x 90 x 65 cm)	120 minutes	6 per minute	208, 50/60	3600	140 (64)	
GP-33859-11						240, 50/60			
Lift-gate door									
GP-33859-12	0.47 (13.3)	9" x 6¾" x 13¾" (23 x 17 x 34 cm)	19" x 35½" x 25½" (48 x 90 x 65 cm)	120 minutes	6 per minute	208, 50/60	3600	140 (64)	
GP-33859-13						240, 50/60			

For this test method, you may also need . . .



[GP-10000-15 Analytical balance](#), 120 g / 0.1 mg



[GP-17803-14 Porcelain crucible](#), 100 mL



[Low-ash mineral oil](#)



[Concentrated sulfuric acid](#)



[Propan-2-ol](#)



[Toluene](#)

ASTM D130 – Corrosiveness to Copper from Petroleum Products by Copper Strip Test

Determines how corrosive the biodiesel sample is toward copper. A polished copper strip is immersed in a biodiesel sample at an elevated temperature. The test strip is examined for evidence of corrosion and classified based on a comparison with ASTM Copper Strip Corrosion Standards. This test serves as a measure of possible difficulties with copper, brass or bronze parts of the fuel system. The presence of acids or sulfur-containing compounds can tarnish the copper strip, indicating the possibility for corrosion.

Copper Corrosion Test Bath System

Microprocessor temperature controller for stability

- Complies with ASTM D130 specifications

Determine the corrosiveness to copper of petroleum-based fuels and biodiesel by immersing a copper strip in the test sample at an elevated temperature. Compare the tarnish color of the strip to an ASTM copper strip corrosion standard (sold separately below) to assess the relative corrosiveness level.

The constant-temperature bath features a digital temperature controller with RTD temperature probe and holder, stirrer motor, and a 750-watt heater; maintains a temperature stability of $\pm 2^\circ\text{F}$ (1°C). Overtemperature control interrupts power to the heater if programmed temperature is reached.

Built-in support rack holds up to 16 test tubes.

What's included: digital temperature controller with RTD temperature probe and holder, stirrer motor with mounting clamp, 750-watt heater, and power cord.

Specifications

Test tube capacity: 16 tubes

Bath capacity: 5 gal. (18.9 L)

Temperature range: ambient to 374°F (190°C)

Temperature stability: $\pm 2^\circ\text{F}$ (1°C)

Heater wattage: 750 W

High-temperature cutoff: adjustable

Wetted materials: stainless steel

Dimensions (W x H x D):
12½" x 14" x 15½" (32 x 36 x 39 cm)

Catalog number	Description	Power (VAC, Hz)	Price
GP-59876-30	Copper corrosion test bath	115, 50/60	
GP-59876-31		230, 50/60	



59876-30

[GP-59876-32](#) **Copper test strip.** Pack of 6

[GP-59876-33](#) **ASTM copper corrosion standard**

[GP-59876-34](#) **Test tube,** 25 x 150 mm. Pack of 16

[GP-59876-35](#) **Vented cork.** Pack of 16

[GP-59876-36](#) **Viewing test tube.** Pack of 16

[GP-59876-37](#) **Polishing vise** for copper strips

[GP-59876-38](#) **Silicone carbide paper,** FEPA grade, 220 grit. Pack of 50

[GP-59876-39](#) **Silicone carbide paper,** FEPA grade, 150 grit. 1-lb pack by weight

[GP-59876-40](#) **White mineral bath oil,** 5 gal. (18.9 L)

For this test method, you may also need . . .



[GP-08009-09](#) **ASTM glass thermometer,** -20 to 102°C



[GP-08009-10](#) **ASTM glass thermometer,** -5 to 215°F



[Stainless steel forceps](#)

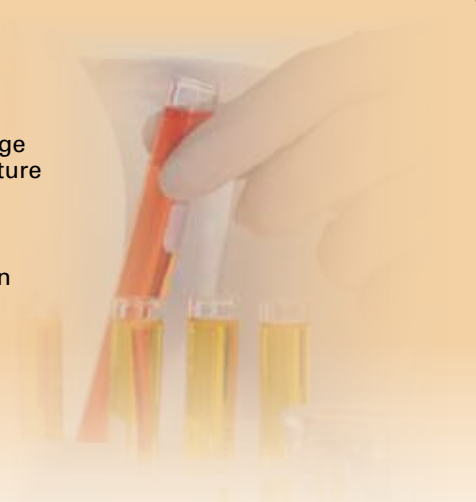


[2,2,4-Trimethylpentane \(Isooctane\)](#)

ASTM D2500 – Cloud Point of Petroleum Products

Detects the temperature at which liquids within the biodiesel sample begin to change to a solid, by crystals appearing in the fuel. This defines the lowest usable temperature of the fuel for trouble-free operation in cold climates. The Cloud Point Refrigerated Bath is used to cool the fuel sample at specified set points.

Cloud point: The temperature of a sample when the smallest cluster of hydrocarbon crystals is first visible.



Koehler Cloud and Pour Point Refrigerated Baths

Cascade refrigeration system provides reliable, long-term service

- Conforms to ASTM D2500 and related specifications

Determine the temperature when the smallest observable cluster of crystals occurs upon cooling, in accordance with ASTM D2500. Benchtop unit features three jacketed mechanically refrigerated baths, each preset to a different temperature: -30, 0, and 30°F (-35, -18, and -1°C).

Each bath has a phenolic top plate with ports for a thermometer and four copper test jackets. Bath interior is constructed of stainless steel; cabinet is constructed of polyester-epoxy finished steel.

What's included: thermometer holder, 12 test jackets and gaskets, 12 cork disks, and 12 test jar gaskets. Order test jar and thermometer separately below.



59861-10



Specifications

Bath temperature presets: -30, 0, and 30°F (-35, -18, and -1°C)

Dimensions (W x H x D): 28" x 35" x 30" (71 x 89 x 76 cm)

Catalog number	Power (VAC, Hz)	Shpg wt lb (kg)	Price
GP-59861-10	115, 60	550 (250)	
GP-59861-15	220-240, 50		

[GP-59861-50](#) Test jar, clear flat bottom with sample height graduation

MORE information!

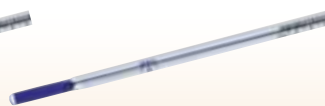
These cloud point refrigerated baths are also required for testing **ASTM D7467 – Diesel Fuel Oil, Biodiesel Blend (B6 to B20)**.



For this test method, you may also need . . .



[GP-08009-03](#) ASTM glass thermometer, -38 to 50°C



[GP-08009-04](#) ASTM glass thermometer, -36 to 120°F



[Sodium sulfate](#)

ASTM D664 – Acid Number of Petroleum Products by Potentiometric Titration

Determines acid constituents in biodiesel products; also used to indicate relative changes that occur during use under oxidizing conditions regardless of the color or other properties of the resulting oil. This Total Acid Number (TAN) titrator is used to determine the level of free fatty acids or processing acids that may be present in biodiesel. Biodiesel with a high acid number has been shown to increase fueling system deposits and may increase the likelihood for corrosion.

Acid number: The quantity of potassium hydroxide per gram of sample necessary to titrate a biodiesel sample within a specified solvent.

Aquamax Total Acid Number (TAN) Titrator

Conforms to ASTM D664 for determination of acidic constituents in petroleum products, lubricants, and transformer insulating oils

- Data logger automatically stores up to 55 analysis results for easy recall
- High precision syringe provides superior dispensing resolution

The Aquamax TAN titrator is easy to operate: simply calibrate, run a blank, select the correct preprogrammed TAN analysis, and the titrator performs the analysis. Intuitive function guide display walks you through operation. Results are displayed on screen in units of KOH/g and are also stored via internal data logger.

Flexible data management options allow for export of readings to a PC or printer. TiCOM software (order separately below) allows viewing and printing of sample input, blank, and titration measurement data. Optional thermal printer accessory allows for the printing of results data. Order separately below.

What's included: glass syringe, burette inlet and outlet tubes, filter cartridge, support with magnetic stirrer, two conical adapters, two support hole caps, three titration vessels, indicator electrode, reference electrode, two electrode cables, calibration vessel, 250-mL bottle of electrode fill solution, ten O-rings, and universal power adapter.



94100-35

Specifications

Dispensing accuracy: ±0.2% for volumes higher than 10% of syringe

Dispensing repeatability: ±0.1% for volumes higher than 10% of syringe

Capacity: 10 mL syringe

Resolution: 1/40000 of syringe volume

Input: two BNC connectors

Output: two RS-232 ports for connection to a PC, printer, telephone connector, or balance

Data logging: 55 points

Display: graphic backlit LCD, 128 x 64 dots

Dimensions (L x W x H): 5 1/8" x 6 1/16" x 11 13/16"
(13.0 x 16.0 x 30.0 cm)



Catalog number	Description	Power	Price
GP-94100-35	Aquamax Total Acid Number (TAN) titrator	90 to 264 VAC, 47 to 63 Hz	

[GP-94100-39](#) Replacement TLL SL syringe, 10 mL

[GP-94100-57](#) Replacement indicator electrode with ATC, SJ7 connector

[GP-94100-59](#) Replacement reference electrode, SJ7 connector

[GP-94100-53](#) Replacement titration vessel, 250 mL. Pack of 3

[GP-94100-79](#) TiCom software kit. Includes software and cable

[GP-94100-71](#) Thermal printer

For this test method, you may also need . . .



[GP-05942-15](#) pH buffer solutions pack



[GP-06137-74](#) Graduated cylinder, 50 mL



[Ethanol](#)



[Lithium chloride](#)



[Potassium hydroxide](#)



[Propan-2-ol](#)

ASTM D4530 – Determination of Carbon Residue (Micro Method)

Determines the carbon residue left after evaporation and pyrolysis of a sample in the Carbon Residue Furnace, providing an indication of the carbon deposit forming tendencies of biodiesels. While not directly correlating with engine deposits, this property is considered an approximation. Although biodiesel is in the distillate boiling range, most biodiesels boil at approximately the same temperature and it is difficult to leave 10% residual upon distillation.

Carbon residue: Remainder of a sample after being heated to 932°F (500°C).

Koehler Micro Carbon Residue Tester

Test up to 12 samples simultaneously for greater efficiency

■ Conforms to ASTM D4530 specifications

The carbon residue test serves as an approximation of the tendency of the test material to form carbonaceous deposits. The test material is subjected to evaporation and pyrolysis under certain conditions and the residue is weighed and the mass percentage calculated. Test up to twelve 2-mL samples simultaneously using the included small vial holder; optional vial holder 59876-51 holds six 16-mL vials and holder 59876-52 has seven places for 2-mL and 16-mL vials. Order vials separately; quartz vials are reusable for the ash content test. Vial 59876-59 is for the MCR test.

What's included: small vial holder (12 place), twelve 2-mL borosilicate vials, cleaning cable, and basket handle.

Specifications

Maximum test temperature: 1022°F (550°C)

Temperature resolution: 1°F/C

Dimensions (W x H x D): 11¼" x 23½" x 9¼" (30 x 60 x 25 cm)

Catalog number	Description	Power (VAC, Hz)	Price
GP-59876-50	Micro carbon residue tester	230, 50/60	

[GP-59876-51](#) Vial holder for six 16-mL vials

[GP-59876-52](#) Vial holder for 2-mL and 16-mL vials, seven places

[GP-59876-53](#) Borosilicate glass vial, 2 mL

[GP-59876-54](#) Borosilicate glass vial, 16 mL

[GP-59876-56](#) Borosilicate glass vial, 2 mL. Pack of 144

[GP-59876-55](#) Borosilicate glass vial, 16 mL. Pack of 144

[GP-59876-59](#) Borosilicate glass vial for MRC test, 4 mL

[GP-59876-57](#) Reusable quartz vial for ash content test, 2 mL

[GP-59876-58](#) Reusable quartz vial for ash content test, 16 mL



59876-50

For this test method, you may also need . . .



[GP-10000-15](#) Analytical balance,
120 g / 0.1 mg



[Pipettes](#)

ASTM D6584 – Determination of Total and Free Glycerin in B100 Biodiesel Methyl Esters by Gas Chromatography

Determines the amount of free and total glycerin in B100 methyl esters. The range of detection for free glycerin is 0.005 to 0.05 mass % and total glycerin from 0.05 to 0.5 mass %. Analyze the sample using the Gas Chromatograph, after being treated with N-methyl-N-trimethylsilyltrifluoroacetamide (MSTFA).

The quality of the biodiesel is dependent on free and bonded glycerin concentration. A high concentration of free glycerin may cause problems during storage or in the fuel system, due to separation of the glycerin. A high total glycerin concentration can lead to injector fouling and may also contribute to the formation of deposits at injection nozzles, pistons, and valves.

Gas Chromatography System for Free and Total Glycerin

Satisfy and perform all of your requirements for ASTM D6584 with this compact, value-priced system

- Includes powerful PeakSimple™ USB data system—connect GC and your Windows® computer for a complete analytical system
- Comprehensive display shows the temperature, pressure, and voltage control
- Ambient to 400°C temperature controllable column oven
- Electronic Pressure Control (EPC) for all GC system gases, including carrier gas, to ensure user safety

This simple-to-use biodiesel GC system is ideal for the quantitative determination of free and total glycerin in B100 methyl esters by gas chromatography. The calibrated results are displayed directly, eliminating off-line calculations.

Both the carrier gas and the Flame Ionization Detector (FID) combustion gas are controlled by programmable Electronic Pressure Controllers (EPCs). EPCs not only provide rock-solid retention time reproducibility, but allow the carrier gas to be pressure ramped (just as the column oven is temperature ramped) from the built-in PeakSimple data system.

The on-column injector is ideal for 1/8" packed and 0.53-mm wide-bore capillary columns, and is suitable for analyses ranging from methane to heavy, high-boiling hydrocarbons (C44+). The column oven accepts column cage diameters up to four inches, is programmable to 752°F (400°C), and recycles quickly with its high-speed cool-down fans.

What's included: FID, on-column injection port, wide-bore capillary column (0.53 mm ID x 15 m, 0.15 µm), PeakSimple data acquisition and control software (compatible with Windows 98/2000/ME/XP/Vista), single-channel USB 2.0-compliant data acquisition hardware, 6-ft (1.8-m) USB 2.0 cable, and GC accessory kit.



34009-07

Specifications



Dimensions (W x H x D): 19" x 14½" x 12½" (48.5 x 36.8 x 31.8 cm)

Catalog number	Description	Power (VAC, Hz)	Price
GP-34009-07	Gas chromatography system for free and total glycerin	115, 50/60	
GP-34009-09		230, 50/60	

[GP-34009-57](#) Optional air compressor for GC system 34009-07

[GP-34009-59](#) Optional air compressor for GC system 34009-09

For this test method, you may also need . . .



ASTM D1160 – Distillation of Petroleum Products at Reduced Pressure

Determines the range of boiling points for samples that can be partially or completely vaporized at a maximum liquid temperature of 752°F (400°C) at reduced pressures. The sample is distilled at a controlled reduced pressure under conditions that are designed to provide approximately one theoretical plate fractionation. Initial and final boiling point is measured and a distillation curve relating volume percent distilled and the atmospheric equivalent boiling point temperature can be prepared.

Biodiesel exhibits a boiling point rather than a distillation curve. The fatty acid chains in the raw oils and fats from which biodiesel is produced are mainly composed of straight-chain hydrocarbons with 16 to 18 carbons that have similar boiling temperatures. The atmospheric boiling point of biodiesel generally ranges from 626 to 675°F (330 to 357°C), thus the specification value of 680°F (360°C) is not problematic. This specification was incorporated as an added precaution to ensure the fuel has not been tainted with high boiling contaminants.

Koehler **Manual Vacuum Distillation System**

Equipped with digital temperature and vacuum displays for improved measurement reading

- Conforms to ASTM D1160 and related specifications

Test the range of boiling points for petroleum and biofuel products with this vacuum distillation system. The sample is distilled at a reduced pressure and the initial and final boiling points are measured. A distillation curve can be generated relating volume percent distilled and the atmospheric equivalent boiling point temperature.

Main body of the system is constructed of an aluminum frame and cold-rolled steel walls with a clear protective door for added safety. Digital controller displays both overhead and flask temperature, along with vacuum reading. Built-in fan reduces cooling time of the distilling flask for shorter turnaround times between tests.

Optional vacuum pump kit (59876-82) includes a vacuum pump, hose nozzle, hinged clamp, outlet filter, filter clamp, one liter of vacuum oil, connection tubing, and two hose clamps.

What's included: standard glassware set, digital control unit, two temperature probes, adjustable scissor jack, heating mantle, connection tubing, hose clamps, quick-disconnect adapters and fittings, and vacuum grease.



59876-80



Specifications

Temperature range: ambient to 797°F (425°C)

Temperature resolution: 0.1°F/C

Temperature accuracy: ±0.9°F (0.5°C)

Vacuum range: 0.1 to 760 Torr

Vacuum resolution: 0.1 Torr

Vacuum accuracy: ±0.2 Torr

Dimensions (W x H x D)

Cabinet: 29½" x 32½" x 9¼"
(75.0 x 82.6 x 23.5 cm)

Controller: 7¾" x 9¾" x 9¼"
(19.7 x 24.7 x 23.5 cm)

Catalog number	Description	Power (VAC, Hz)	Shpg wt lb (kg)	Price
GP-59876-80	Manual vacuum distillation system	115, 60	120 (54.4)	
GP-59876-81		220-240, 50/60		

GP-59876-82 Optional vacuum pump kit

For this test method, you may also need . . .



GP-12129-00 Circulating bath, 10 L



GP-36225-30 Heating mantle, for 500-mL flask



n-Tetradecane



Concentrated sulfuric acid



Cyclohexane



Toluene

ASTM D7501 – Determination of Fuel Filter Blocking Potential of Biodiesel Blend Stock by Cold Soak Filtration Test

Determines the filtration time of the biodiesel sample and assesses the possibility of soluble substances in the sample to clog the filter. After cooling the sample and allowing it to reach room temperature, soluble substances will come out of the biodiesel sample. Using a Vacuum Filtration System to evaluate the elapsed time, short filtration times are expected to provide satisfactory vehicle operation at cloud point temperatures of the biodiesel samples.

ADVANTEC® All-Glass Filtration Assemblies

Ideal for biodiesel cold soak filtration tests

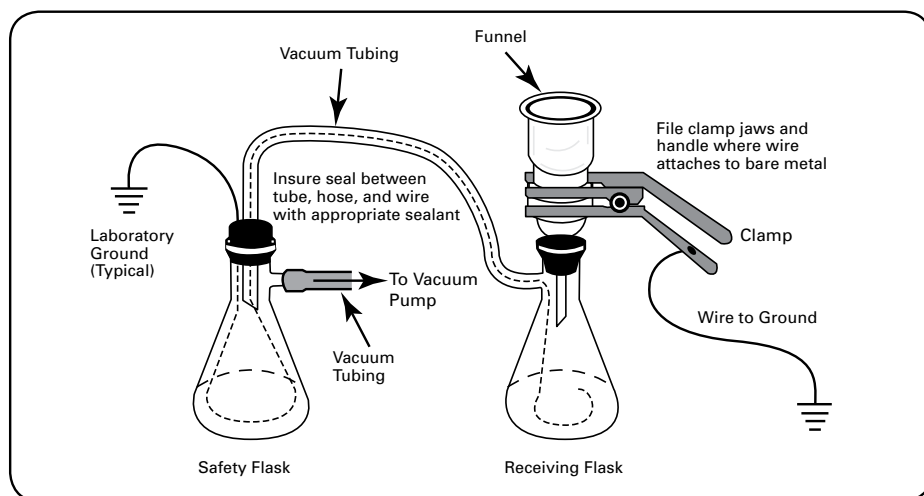
All-glass assemblies are ideal for biodiesel testing, aggressive solvents, and applications where you need to minimize the materials that contact sample or filtrate. Filter holder mounts on filtration flask using a ground glass joint; order standard 47-mm filter paper separately below. Outlet of support base drip tube is positioned below the side arm connection to prevent sample aspiration into vacuum line.

What's included: funnel, support base, receiving flask, and clamp.



Catalog number	Membrane size	Support	Filtration area	Funnel size	Flask size	Price
GP-06645-49	47 mm	Glass frit	9.6 cm ²	300 mL	1000 mL	
GP-06645-65		Stainless steel				
GP-06645-41		PTFE				

[GP-06645-51](#) Replacement receiver flask, 1000 mL



For this test method, you may also need . . .


GP-06648-91 Glass microfiber filter paper; 47 mm; 0.7 µm


Vacuum pumps


Vacuum tubing


Timers


Heptane


2,2,4-Trimethylpentane (Isooctane)

EN 15751 – Determination of Oxidation Stability by Accelerated Oxidation Method

During the oxidation process of biodiesels, acids can form and cause deposits in fuel systems, which can lead to clogging of filters and ultimately fuel system malfunctions. The conductivity of samples is measured during the oxidation process to determine the stability of the sample over time.

Oxidation stability: Rate of degradation of biodiesel by oxygen in the air, potentially harming physical properties such as viscosity and acid values.

ASTM D5453 – Determination of Total Sulfur by Ultraviolet Fluorescence

Determine the total sulfur content in biodiesel samples, which should be essentially sulfur-free. Sulfur can affect the performance of the emissions control systems and engine wear.

ASTM D613 – Cetane Number of Diesel Fuel Oil

Determines the cetane value (typically between 30 to 65) of the biodiesel using a single cylinder, four-stroke cycle, variable compression ratio, indirect injected diesel engine. Engine manufacturers and petroleum refineries use this test for fuel and engine compatibility.

Cetane number: Measurement of the combustion quality during ignition.

ASTM D4951 – Phosphorus Additives by Inductively Coupled Plasma Atomic Emission Spectrometry

Analyze samples by Inductively Coupled Plasma (ICP) atomic emission spectrometry. High levels of phosphorus can damage the catalytic converter in emissions systems. Test results must not exceed the specification of 10 ppm of phosphorus.

EN 14538 – Determination of Calcium, Potassium, Magnesium, and Sodium Content by Optical Emission Spectral Analysis with Inductively Coupled Plasma

Determine the combined concentration of calcium, potassium, magnesium, and sodium by optical emission spectral analysis with inductively coupled plasma (ICP). Present as abrasive solids or soluble metallic soaps, calcium and magnesium can contribute to injector, fuel pump, piston and ring wear, along with engine deposits and filter system blockage. Sodium and potassium may form abrasive solids or metallic soaps, which may cause abrasion and filter plugging.

For these test methods . . .

Contact us at **800-323-4340** for more information on products that conform to these test methods.

