

petrotest®



FLASH-POINT & AUTO-IGNITION TESTER



MANUFACTURER SINCE 1873

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Flash Point Methods 3

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Petrotest® Company on the rear

Multi-Function-Head - ONE-TWIST

Unbelievable fast swivel-around process within two steps only:

Step 1



Simply insert the complete test insert (cup with cover and multi-detector).

Please use the tongs (supplied with the instrument) or the optional handle which will be attached to the cup permanently.

Step 2



Snap-in the head - Ready!
Just lift up the head a little bit and turn it clockwise.

All connections with stirrer, cup opening, igniter position, temperature- & flash-point indicator are made simultaneously after twisting the head into position.

The next flash-point test can be started.

Note: Figure with electric-ignition.
The procedure with gas-ignition is the same



Abel-Method

The Abel method specifies a method for the determination of the closed cup flash-point of petroleum products and other liquids having flash-points between -30 °C and +70 °C.



TAG-Method

The Tag method covers the determination of the flash-point of liquids with a viscosity below 5.5 mm²/s (cSt) at +40°C (104°F), or below 9.5 mm²/s (cSt) at +25°C (77°F), and a flash-point below +93°C (200°F).

Pensky-Martens-Method

Flash-point determination of petroleum products with a temperature range of +40°C to +360°C using:

- Method A: for fuel oils, lubricating oils and other homogeneous liquids.
 Method B: for non-homogeneous materials like mixtures of liquids and solids, surface-film building liquids or liquids with a viscosity above 5.5 cSt at +40°C.



Cleveland-Method

This flash-and fire-point test method is a dynamic method and depends on definite rates of temperature increases to control the precision of the method.

Its primary use is for viscous materials having a flash-point between +79°C (175°F) and +400°C (752°F) except fuel oils, to define the hazards of flammable and combustible materials used in shipping and safety regulations.

Auto-Ignition-Method

For the determination of liquids and gases, in particular of mineral hydrocarbons and their mixtures, having an auto-ignition temperature between +75°C and +650°C.

Auto-ignition serves to measure the tendency of substances to ignite themselves when contact is made with hot objects. It enables a classification of the substances with respect to safety aspects.



Rapid Equilibrium-Method

Closed Cup Method:

These test methods cover procedures for the determination of the flash-point by a small-scale closed tester. The procedures may be used to determine the actual flash-point temperature of a sample or whether a product will or will not flash at a specified temperature (flash / no flash).

Open Cup Method:

These test methods cover procedure for sustained burning of liquid mixtures using the small scale open-cup apparatus



Scope of Application

The **Abel-Method** describes the determination of the closed-cup flash-point of petroleum products and other liquids having flash-points between -30°C and +70°C.

Further it may be used for flash point determination of petroleum products, black oils, bitumens, fluxed bitumens, fluidized and cut-back asphalts.

The **Equilibrium-Method** describes the determination of the closed-cup flash/no flash temperature of paints, varnishes, paint binders, solvents, adhesives, petroleum & related products between -30°C and +110°C.

The **Abel-Pensky-Method** describes the determination of the closed-cup flash-point of petroleum products and other combustible liquids having flash-points between -30 °C and +65 °C.

Flash-Point Testing with Closed Cup acc. ABEL - ABA 4 (automatic)

Abel Method:

IP 170 (BS 3442-2) - ISO 13 736 (NF M07-011)

Equilibrium Method (Flashpoint):

ISO 1523 - IP 492 (IP 304-1) - EN 924

Equilibrium Method (Flash/no Flash):

ISO 1516 - IP 491 (IP 304-2)

Abel-Pensky Method:

DIN 51 755-1 - NF M07-036 (DIN 53 213)

Rapid Equilibrium-Simulation (Flashpoint):

ISO 3679 (BS 6664-4, EN 456, NFT60-616)

Rapid Equilibrium-Simulation (Flash/no Flash):

ISO 3680 (BS 6664-3, DIN 55 680, NF T60-617)



Temperature Range:
with Air Cooling:
+10°C ... +110°C
with Liquid Cooling:
-30°C ... +110°C

Extended Measuring Range

up to +110°C for greater versatility. Allows users to go beyond the conventional scope of the Abel method.

Economical Standard Version

for the operating span +10°C to +110°C with fan-cooled Peltier elements. This avoids messy tubing on the laboratory bench and minimizes cooling water usage.

Low Temperature Version

for an operating span of -30°C to +110°C. Requires water-cooling by a small coolant circulator or tap water (lowest achievable temperature -20°C).

Barometric Pressure Correction

by a built-in pressure sensor to measure the ambient pressure directly at the ABA 4.

User Definable Test Programs

to make customized test methods.

Equilibrium-Simulation Mode

Search Mode

saves time, when the flash-point of a sample is unknown.

Rapid Heating Mode

for samples with a high flash-point. The sample is first heated with boosted power and then the heating rate is automatically reduced to the standardized rate when approaching the critical testing phase.

Compact Design

occupies a bench-top area of only 23 cm wide and 47 cm in depth. Effectively using the work bench depth and not wasting the waste its valuable length. A serious consideration when the ABA 4 is placed in a fume hood.

Summary of Method

For the **FLASH / NO FLASH** determination ignition source is applied to a tempered sample to observe whether or not a flash occurs. Used to detect the ability to yield flammable vapors.

The **FLASH-POINT** is the lowest temperature at which the application of an ignition source causes the specimen vapors to ignite.

User Groups:

Fuel, Jet Fuel, Paint, Regulatory Authorities, Solvent, Varnish

Easy to operate:

Insert the filled test cup, complete with the lid and shutter assembly, plug-in the multi-detector and shift the multi-function-head - **ONE TWIST** into its test position.

All electrical connections and the coupling of the stirring motor are carried out automatically.

Pressing a key selects the suitable test method from a **list of programmed standards** or one of the user defined **USER**-programs.

Or simply recall one of the stored test runs from the program library.

Even better: **ABACon software** allows remote control of the ABA 4 and test data storage capability on a PC.

Two igniter systems: **gas flame and electrical igniter** are both included.

The performance of the **electrical igniter is permanently checked**, which results in better reproducibility and a longer lifetime of the igniter. This control also signals when the igniter is to be changed, possibly due to excessive aging or damage.

If the **gas flame** is used, a sensor watches the ignition flame and causes an **automatic relighting** or stops the test, if this should not be possible.

Outside Flame Sensor for samples having no conventional flash-point (e.g. due to flame inhibiting components) but burn outside the test cup.

Probe Verification Program checks the proper function of the temperature probe and allows a bias adjustment, using a special accessory kit.



Main Units

ABA 4 - Automatic Flash-Point Tester, Abel Method (air cooled)

Abel Method : IP 170 - ISO 13 736

with further accessories for:

Abel-Pensky Method : DIN 51 755-1 - NF M07-036

Rapid Equilibrium-Simulation : ISO 3679 - ISO 3680

Features:

- swivel-around multi-function-head - ONE TWIST
- automatic barometric pressure correction
- equilibrium-simulation mode
- rapid heating mode
- 2 user definable test programs
- Peltier element system
- integrated flame sensor
- PC-software

Consisting of:

stainless steel housing with two-color powder coating, touch-key panel with large LC-display (visible in up to 10 m distance), swivel-mounted multi-function-head - ONE-TWIST, stirrer drive, two RS232-interfaces for data printer and computer connection, different test-programs, data-transfer and software upgrading through bi-directional interface, Peltier element system, automatic barometric pressure correction, automatic overheat protection, power controlled/monitored electric igniter, gas igniter with auto-relighting and safety shut-off.

PC-Software "ABACon" (Windows®):

for easy handling and storing of data, as well as program transfer from the PC-Memory into the ABA 4. Easy to read tableau. Numerous programs can easily be set, copied from the memory and modified. Permanent indication of test status. Due to the most comfortable properties of this software to display and modify actual and future test sequences, it is most recommendable for samples of permanently changing characteristics.

Supplied with:

- 1 cup "ABA"
- 1 cover "ABA"
- 1 multi-detector "ABA"
- 1 gas igniter
- 1 electric igniter
- 1 stopper
- 1 tong for cup
- 1 tray for cup and multi-detector
- 1 stirrer coupling
- 1 PC-software "ABACon"

Temperature Range: **+10 to +110 °C** (+50 to +230 °F)

12-0501	Power supply	: 115/230 V, 50/60 Hz, EU-plug
12-0502	Power supply	: 115/230 V, 50/60 Hz, US-plug

ABA 4 - Automatic Flash-Point Tester, Abel Method (liquid cooled)

Abel Method: ISO 13 736 - IP 170

Equilibrium Method: ISO 1523 - IP 492 - EN 924

(flash / no flash) ISO 1516 - IP 491

with further accessories for:

Abel-Pensky Method: DIN 51 755-1 - NF M07-036

Consisting of:

see Standard Unit (12-0501), but with cooler connections for external liquid cooling.

Software (Windows®): see Standard Unit (12-0501)

Supplied with: see Standard Unit (12-0501)

Note: Circulation cooler (e.g. 25-0382) is required.

Temperature Range: **-30 to +110 °C** (-22 to +230 °F)

12-0503	Power supply	: 230 V, 50/60 Hz, EU-plug
12-0504	Power supply	: 115 V, 60 Hz, US-plug



gas igniter &
electric auto-ignition device

Technical Data

Temperature Range:

- +10 to +110°C (air cooled)
- 30 to +110°C (liquid cooled)

Programs: (acc. to international standards)

- 2x ISO-Standards
- 2x Rapid-Heating
- 2x Search Run
- 2x Equilibrium
- 2x Rapid-Test Simulation
- 2x User Defined
(Abel-Pensky Meth. preset)

Ignition Type: (included)

- gas & electric

Stirring Speed: (adjustable)

- 0 and 100 rpm

Sensing System:

- differential-thermocouple

Barometric

Pressure Sensor:
automatic correction
of the measured values

Safety:

- overheat protection
- automatic shut-off

Hardware Clock: included

Interface:

- RS232 (for printer)
- RS232 (for computer download)
(USB-converter available)

Gas Connection:

- for propane/butane or
natural gas (max. 50 mbar)

Display: °C / °F (selectable)

- high x wide: 56 x 90 mm
- digit size : 25 mm

Dimensions:

- Width 230 mm
- Depth 470 mm
- Height 460 mm
- Weight 8 kg

Power Consumption:

- approx. 180 Watts

Power Supply: (selectable)

- 230/115 V, 50/60 Hz



Cooling



25-0382



25-0228



12-0518



12-1508



11-0599



25-0282

Circulation Cooler (for external cooling)

Application:

Necessary for counter-cooling the Peltier element system (to let the ABA 4 reach a test-temperature of approx. -30 °C (at +20°C ambient temperature)).

Consisting of:

Cooler with tank, digital display, pump and liquid level indication.

Supplied with: 1 insulated hose-set (Ø 8 mm, 2x 2m)

Note: Instrument designed for ambient temperatures of +5 to +32°C.

Technical Data:

Working range : -20 to +40°C
 Display / Resolution : digital / 0.1°C
 Control : digital
 Cooling capacity : 300 W at +15°C
 Pump-Pressure capacity : 12 l/min, 200 mbar
 Pump-Suction capacity : 12 l/min, 100 mbar
 Volume : 1.4 l
 Sockets for : hose (Ø 8 / 12 mm), Pt-100
 Dimensions / Weight : 23 x 36 x 38 cm (WxDxH), 23 kg

25-0382 Power supply: 230 V, 50/60 Hz, 3.5 A, EU-plug
 25-0383 Power supply: 115 V, 60 Hz

25-0228 Insulating Hose Set for circulation cooler

Consisting of:

2 x 2 m hoses (Ø 8 mm), 4 hose clamps

12-0518 Insulating Hood as ice protection to protect the cover and shutter assembly from icing.

Recommended for low temperature flash-point tests, made of Styrofoam®.

Options & Accessories

12-0520 Calibration Set "ABA"

Consisting of:

1 calibration cover, 1 thermometer IP 74C, 1 thermometer IP 2C

12-1762 Calibration-Adapter for Pt-100 in multi-detector

12-1508 Draft Guard (recommended for gas ignition tests)

12-1509 Stand to hold 12 multi-detectors

12-1763 Storage Box for spare parts and tools

50-9023 Reference Liquid (Kerosene) with certificate, 500 ml range: approx. +35 °C to +60 °C

Note: Requires special shipment as hazardous goods

12-0571 PC-Software "ABApr" (Windows®): to extend the ABAcon-functions and allow the direct data export to Excel® (not included).

Further possibilities are the connection of up to 4 ABA-units on 1 PC.

Note: For each ABA-unit a separate ABApr-software is to be ordered.

11-0599 USB/RS232-Converter (verified for petrotest®-units) with 2 m cable connecting 1 serial port with the USB-port of a PC or Hub

Serial Impact Printer for single sheet & continuous paper with USB-interface to record data like test results, duration of test, etc. (instead of a PC)

Supplied with: 1 data transmission cable, 1 ink ribbon (black)

Technical Data:

Line spacing : 80 characters per line (10 cpi)
 Page size (W x H) : 257x364 mm (sheet), 254x558.8 mm (roll)
 Ports : serial, USB (1.1) & parallel
 Dimensions : 37 x 28 x 16 cm (WxDxH), weight 5 kg

25-0282 Power supply : 220/240 V, 50/60 Hz
 25-0283 Power supply : 100/130 V, 50/60 Hz



Test Inserts

Standard Test Equipment

- 12-0510** **Standard Test Insert "ABA"** (incl. in ABA 4)
 Consisting of:
 1 cup and 1 cover, 1 multi-detector
- 12-0511** **Standard Cup "ABA"**, 79 ml
- 12-0512** **Standard Cover "ABA"**, with shutter assembly
- 12-0513** **Standard Multi-Detector "ABA"**, with flash-point detector & temperature probe



12-0510
(12-0512 & 12-0511 & 12-0513)

- 12-1512** **Cover "Abel-Pensky"** for older AP standards
 with shutter assembly for standard cup "ABA" (without stirrer)

Rapidflash Simulations Test Equipment

- 12-1514** **Rapidflash Simulation Set**
 Consisting of:
 1 rapidflash cup, 1 rapidflash cover, 1 stopper, 1 syringe and 1 multi-detector
- 12-1515** **Rapidflash Cup**
- 12-1516** **Rapidflash Cover**, with shutter assembly
- 12-1518** **Syringe** for sample introduction, 10 ml
- 12-0577** **Multi-Detector "pAB/pTA"** for rapidflash-tests, with flash-point detector & temperature probe

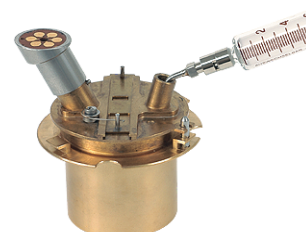


12-1512 & 12-0511 & 12-0513

Note: Flash-point results of rapidflash simulation may deviate from standard results.

Milli Test Equipment (for small sample amounts), composed of:

- 12-0575** **Milli Cup "pAB"**, for sample quantity between 2 ... 15 ml, ideal 7 ml
- 12-0574** **Milli Cover "pAB"**, with shutter assembly
- 12-0577** **Multi-Detector "pAB/pTA"** for milli-tests, with flash-point detector & temperature probe



12-1514
(12-1516 & 12-1515 & 12-0577)

Note! Flash-point results of milli test inserts may deviate from standard results.

Spare Parts

- 12-0778** **Electric Igniter** with connector cable and plugs
- 12-0509** **Gas Igniter** with 25 cm hose
- 12-0514** **Safety Detector** to control gas igniter and external inflammation
- 12-0600** **Tray** for cup and multi-detector
Note! Available as an option for all ABA 4 units built before 05/2004.
- 12-0790** **Tong** for safe handling of hot handleless test cups
- 12-1507** **Stirrer Couplings**, pack of 10
- 12-0791** **Stopper**, brass (Ø 18 mm), to close the multi-detector opening of the cover before use



12-0514



12-0600



12-1763



Scope of Application

The **Abel-Method** describes the determination of the closed-cup flash-point of petroleum products and other liquids having flash-points between -30°C and +70°C.

Further it may be used for flash point determination of petroleum products, black oils, bitumens, fluxed bitumens, fluidized and cut-back asphalts.

The **Equilibrium-Method** describes the determination of the closed-cup flash/no flash temperature of paints, varnishes, paint binders, solvents, adhesives, petroleum & related products between -30°C and +110°C.

Temperature Range:

-18°C ... +70°C



12-1280 & 12-1281



12-0629



12-1286

Flash-Point Testing with Closed Cup acc. ABEL (semi-automatic)

Abel Method:

IP 170 (BS 3442-2) - ISO 13 736 (NF M07-011)

Equilibrium Method:

ISO 1516 - IP 491 (IP 304-2)

ISO 1523 - IP 492 (IP 304-1) - EN 924

Main Unit

Semi-Automatic Flash-Point Tester, ABEL Method

Abel Method : IP 170 - ISO 13 736

not over full temperature range:

Equilibrium Method : ISO 1523 - IP 492 - EN 924

(flash / no flash) : ISO 1516 - IP 491

Consisting of:

water bath with electric heater and cooling coil
for connection of an external cooler,
energy regulator, electric stirrer

Supplied with:

1 cup, 1 cover with gas-igniter, 1 thermometer IP 74C (for cup),
1 thermometer IP 75C (for bath), 1 thermometer depth-gauge

Note: Circulation cooler (e.g. 25-0382) might be necessary.

Technical Data:

Temperature range : -18 to +71 °C (-0.4 to +160 °F)

Cooling : liquid cooled (external)

Ignition : gas

Dimensions : 27 x 32 x 47 cm (W x D x H), weight: 9 kg

12-1270 Power supply: 230 V, 50/60 Hz

12-1271 Power supply: 115 V, 50/60 Hz



Options & Accessories

12-0052 **Pipette**, 25 ml

12-0629 **Pre-Regulating Valve** for gas supply with hose adapter, for all types of burning gases

12-1750 **Digital Precision Barometer**, 0 to 1300 mbar : 1 mbar

12-1751 **Case** for barometer

12-1752 **Certificate** for barometer with: **5 measuring points**

12-1753 **Certificate** for barometer with: **10 measuring points**

12-1754 **Battery** 9-V-Block, for barometer

Thermometer

Precision Made	Officially Certified	Type		Range
		ASTM	IP	
16-0375	16-0376	6C	2C	-80 to + 20 : 1 °C
16-0377	16-0378	6F	2F	-112 to + 70 : 2 °F
90-0306	90-1306		74C	-35 to + 70 : 0.5 °C (for cup)
90-0247	90-1247		74F	-35 to +160 : 1 °F (for cup)
90-0248	90-1248		75C	-30 to + 80 : 0.5 °C (for bath)
90-0307	90-1307		75F	-25 to +180 : 1 °F (for bath)

Spare Parts

12-1282 **Thermometer Collar**, Ø 11.7 mm

12-1286 **Thermometer Depth Gauge**

12-1277 **Stirrer-Motor**, 30 rpm,
Power supply: 24 V, 50 Hz

12-1280 **Cup "Abel"**

12-1281 **Cover "Abel"** with gas igniter

12-1283 **Flexible Stirrer Shaft**

12-1284 **Heater**, Power supply: 230 V

User Groups:

Fuel, Jet Fuel, Paint, Regulatory Authorities, Solvent, Varnish



Upgrading Accessories for Semi-Automatic Flash-Point Tester



12-1669 Digital-Thermometer

An alternative for glass-thermometers.

Hold-key stops the display for easy storing of the Flash-Point, while the normal display runs further.

This enables much more comfortable work with a Flash-Point test.

Measuring Range: up to +400 °C



Scope of Application

The TAG method describes the flash-point determination of liquids with a viscosity below 5.5 mm²/s (cSt) at +40°C (104°F) or below 9.5 mm²/s (cSt) at +25°C (77°F) and a flash-point below +93°C (200°F).

This method can indicate the possible presence of highly volatile and flammable materials in a relatively nonvolatile or nonflammable material.

For example, an abnormally low flash-point on a sample of kerosene can indicate gasoline contamination.

Summary of Method

A brass test cup is filled to the inside mark with test specimen, fitted with a cover and heated. An ignition source is directed into the test cup at regular intervals until a flash is detected.

For the **FLASH / NO FLASH** determination ignition source is applied to a tempered sample to observe whether or not a flash occurs. Used to detect the ability to yield flammable vapors.

The **FLASH-POINT** is the lowest temperature at which the application of an ignition source causes the specimen vapors to ignite.

It measures the tendency of the specimen to form a flammable mixture with air and is only one of a number of properties that shall be considered in assessing the overall flammability hazard of a material.

Temperature Range:

With Air Cooling:
0°C ... +110°C

With Liquid Cooling:
-30°C ... +110°C

User Groups:

Fuel, Gasoline, Jet Fuel, Kerosene, Mastics, Paint, Regulatory Authorities, Solvent, Turbine Fuel, Varnish

Flash-Point Testing with Closed Cup acc. TAG - TAG 4 (automatic)

TAG Method:

ASTM D 56 - FTM 791-1101 - JIS K2265

Equilibrium Method (Flashpoint):

ISO 1523 - IP 492 (IP 304-1) - EN 924

ASTM D 3941

Equilibrium Method (Flash/no Flash):

ISO 1516 - IP 491 (IP 304-2)

ASTM D 3934

Rapid Equilibrium-Simulation (Flashpoint):

ISO 3679 (BS 6664-4, EN 456, NF T60-616)

Rapid Equilibrium-Simulation (Flash/no Flash):

ISO 3680 (BS 6664-3, DIN 55 680, NF T60-617)

TAG 4 is a fully automatic closed cup flash-point tester which, in its **Standard Version**, covers a measuring range of 0 to +110°C.

A **Low Temperature Version** is available for lower flash-points, extending the operating span down to approx. -30°C.

The instrument uses **solid state cooling elements**. This avoids any external cooling and messy tubing.

The result is a **compact design** with a bench space of 23 by 47 cm - a serious consideration when the TAG 4 shall be placed in a fume hood.

Only the Low Temperature Version needs a small cooling circulator.



TAG 4 - easy to operate:

Shift the patented **multi-function-head - ONE TWIST** with one hand in its operating position and all connections are made: assembly of igniter, temperature- and flash-point indicator.

A **touch key panel and a large LC-display** allow comfortable setting of the estimated flash-point, selection of the test program, indicates whether the flash-point is valid and shows error messages (e.g. igniter failure).

Temperature indication, choice in either °C or °F.

Automatic barometric pressure correction of the measured flash-point.

Strike a key to make the choice between the:

- **ASTM Standard Program, Search Mode** (to find the approximate flash-point of unknown samples faster)

- **Rapid Heating Mode** (for samples with a high flash-point)

- **IP Equilibrium Method**

- **USER Definable Program** in order to customize your very particular test procedure.

To check the proper function of the temperature probe, a **Probe Verification Program** (in conjunction with a special test lid and a certified thermometer) can be applied.

TAG 4 - supplied with 2 igniter systems:

Gas flame with automatic re-lighting and shut-off in case of repeated malfunction and an **electrical igniter** with a permanent check and control of its electrical values. This ensures a better reproducibility and a longer life. Further, this control signals when the igniter is to be changed, possibly due to excessive aging or damage.

There are two **RS232 interfaces**:

one for direct connection of a measurement printer and a second one for bi-directional PC connection, as requirement for the most advantageous use of the **TAGCon software**, which allows remote control of the TAG 4 and the storage of all test.

Additional **safety features** are:

a special sensor that monitors if there is a flame outside the test cup (e.g. samples with no conventional flash-point due to flame inhibiting components), and the automatic shut-off in case of excessive sample heating.



Main Units

TAG 4 - Automatic Flash-Point Tester, TAG Method (air cooled)

TAG Method: ASTM D 56 - FTM 791-1101 - JIS K2265
 Equilibrium Method: ASTM D 3941 - EN 924
 (flash/no flash) ASTM D 3934

with further accessories for:

Rapid Equilibrium-Simulation: ISO 3679 - ISO 3680

Features:

- swivel-around multi-function-head - ONE TWIST
- automatic barometric pressure correction
- automatic overheat protection
- Peltier element system
- flash-point control, also for external ignition
- rapid heating mode
- PC-software

Consisting of:

stainless steel housing with two-color powder coating, touch-key panel with large LC-display (visible in up to 10 m distance) swivel-mounted multi-function-head - ONE-TWIST, two RS232-interfaces for data printer and computer connection, different test-programs, data-transfer and software upgrading through bi-directional interface, Peltier element system, automatic barometric pressure correction, automatic overheat protection, power controlled & monitored electric igniter, gas igniter with auto-relighting and safety shut-off, re-cooling fan.

PC-Software "TAGCon" (Windows®):

for easy handling and storing of data, as well as program transfer from the PC-Memory into the TAG 4. Easy to read tableau. Numerous programs can easily be set, copied from the memory and modified. Permanent indication of test status. Due to the most comfortable properties of this software to display and modify actual and future test sequences, it is most recommendable for samples of permanently changing characteristics.

Supplied with:

- 1 cup "TAG"
- 1 cover "TAG"
- 1 multi-detector "TAG"
- 1 gas igniter
- 1 electric igniter
- 1 stopper
- 1 tong for cup
- 1 tray for cup and multi-detector
- 1 PC-software "TAGCon"

Temperature Range: **0 to +110 °C** (+32 to +230 °F)

12-0540	Power supply	: 115/230 V, 50/60 Hz, EU-Plug
12-0541	Power supply	: 115/230 V, 50/60 Hz, US-Plug



Connections: Air Cooled

TAG 4 - Automatic Flash-Point Tester, TAG Method (liquid cooled)

TAG Method: ASTM D 56 - FTM 791-1101 - JIS K2265
 Equilibrium Method: ASTM D 3941 - ISO 1523 - IP 492 - EN 924
 (flash/no flash) ASTM D 3934 - ISO 1516 - IP 491

Consisting of:

see Standard Unit (12-0540), but with cooler connections for external liquid cooling.

Software (Windows®): see Standard Unit (12-0540)

Supplied with: see Standard Unit (12-0540)

Note: Circulation cooler (e.g. 25-0382) is required.

Temperature Range: **-30 to +110 °C** (-22 to +230 °F)

12-0542	Power supply:	230 V, 50/60 Hz, EU-plug
12-0543	Power supply:	115 V, 60 Hz, US-plug



Connections: Liquid Cooled



gas igniter &
electric auto-ignition device

Technical Data

Temperature Range:

- 0 to +110°C (air cooled)
- 30 to +110°C (liquid cooled)

Programs: (acc. to international standards)
 2x ASTM Standards
 2x Rapid-Heating
 2x Search Run
 2x Equilibrium
 2x Rapid-Test Simulation
 2x User Defined

Ignition Type: (included)
 gas & electric

Stirring Speed: --

Sensing System:
 differential-thermocouple

Barometric Pressure Sensor:
 automatic correction
 of the measured values

Safety:
 overheat protection
 automatic shut-off

Hardware Clock: included

Interface:
 RS232 (for printer)
 RS232 (for computer download)
 (USB-converter available)

Gas Connection:
 for propane/butane or
 natural gas (max. 50 mbar)

Display: °C / °F (selectable)
 high x wide: 56 x 90 mm
 digit size : 25 mm

Dimensions:
 Width 230 mm
 Depth 470 mm
 Height 460 mm
 Weight 8 kg

Power Consumption:
 180 Watts

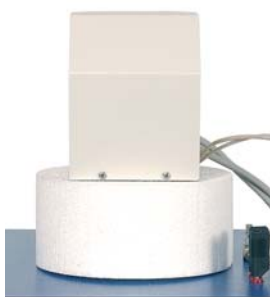
Power Supply: (selectable)
 230/115 V, 50/60 Hz



25-0382



25-0228



12-0518



12-1508



12-1763



11-0599

Cooling

Following flash-points can be achieved by different coolant temperatures:	Fluid Temperature	achievable Flash-Point Range
	-15°C	-30 to +45°C
+15°C	-5 to +75°C	
+50°C	+110°C	

Circulation Cooler (for external cooling)

Application:

Necessary for counter-cooling the Peltier element system (to let the TAG 4 reach a test-temperature of approx. -30 °C (at +20°C ambient temperature)).

Consisting of:

Cooler with tank, digital display, pump and liquid level indication.

Supplied with: 1 insulated hose-set (Ø 8 mm, 2x 2m)

Note: Instrument designed for ambient temperatures of +5 to +35°C.

Technical Data:

Working range : -20 to +40°C
 Display / Resolution : digital / 0.1°C
 Control : digital
 Cooling capacity : 300 W at +15°C
 Pump-Pressure capacity : 12 l/min, 200 mbar
 Pump-Suction capacity : 12 l/min, 100 mbar
 Volume : 1.4 l
 Sockets for : hose (Ø 8 / 12 mm), Pt100
 Dimensions / Weight : 23 x 36 x 38 cm (WxDxH), 23 kg

25-0382 Power supply: 230 V, 50/60 Hz, 3.5 A, EU-plug
25-0383 Power supply: 115 V, 60 Hz

25-0228 Insulating Hose Set for circulation cooler

Consisting of:

2x 2 m hoses (Ø 8 mm), 4 hose clamps

12-0518 Insulating Hood as ice protection

to protect the cover and shutter assembly from icing.

Recommended for low temperature flash-point tests, made of Styrofoam®.

Options & Accessories

12-0559 Calibration Set "TAG"

Consisting of:

1 calibration cover, 1 thermometer ASTM 9C/IP 15C, 1 thermometer IP 57C

12-1762 Calibration-Adapter for Pt-100 in multi-detector

12-1508 Draft Deflector (recommended for gas ignition tests)

12-1509 Stand to hold 12 multi-detectors

12-1763 Storage Box for spare parts and tools

50-9114 Reference Liquid "ASTM D 56" (approx. +47°C), 255 ml

Note: Requires special shipment as hazardous goods.

12-0572 PC-Software "TAGpro" (Windows®):

to extend the TAGcon-functions and allow the direct data export to Excel® (not included).

Further possibilities are the connection of up to 4 TAG-units to 1 PC.

Note: For each TAG-unit a separate TAGpro-software is to be ordered.

11-0599 USB/RS232-Converter (verified for petrotest®-units)

with 2 m cable connecting 1 serial port with the USB-port of a PC or Hub

Serial Impact Printer for single sheet & continuous paper with USB-interface to record data like test results, duration of test, etc. (instead of a PC)

Supplied with: 1 data transmission cable, 1 ink ribbon (black)

Technical Data:

Line spacing : 80 characters per line (10 cpi)
 Page size (W x H) : 257x364 mm (sheet), 254x558.8 mm (roll)
 Ports : serial, USB (1.1) & parallel
 Dimensions : 37 x 28 x 16 cm (WxDxH), weight 5 kg

25-0282 Power supply : 220/240 V, 50/60 Hz
25-0283 Power supply : 100/130 V, 50/60 Hz



Test Inserts

Standard Test Equipment

- 12-0553 **Standard Test Insert "TAG"** (incl. in TAG 4)
Consisting of:
1 cup and 1 cover
- 12-0548 **Standard Cup "TAG"**, 50 ml
- 12-0549 **Standard Cover "TAG"**, with shutter assembly
- 12-0550 **Standard Multi-Detector "TAG"**
with flash-point detector (thermocouple) and temperature probe, made of glass
- 12-1550 **Multi-Detector "TAG-NIRO"** (alternative to standardized type)
with flash-point detector (thermocouple) and temperature probe, made of stainless steel



12-0553

Rapidflash Simulation Test Equipment

- 12-1514 **Rapidflash Simulation Set**
Consisting of:
1 rapidflash cup, 1 rapidflash cover, 1 stopper, 1 syringe and 1 multi-detector
- 12-1515 **Rapidflash Cup**
- 12-1516 **Rapidflash Cover**, with shutter assembly
- 12-1518 **Syringe** for sample introduction, 10 ml
- 12-0577 **Multi-Detector "pAB/pTA"** for rapidflash-tests, with flash-point detector & temperature probe



12-1514

Note: Flash-point results of rapidflash simulation may deviate from standard results.

Milli Test Equipment (for small sample amounts), composed of:

- 12-0560 **Milli Cup "pTA"**, for sample quantity between 2 ... 15 ml, ideal 7 ml
- 12-0549 **Standard Cover "TAG"**, with shutter assembly
- 12-0577 **Multi-Detector "pAB/pTA"** for milli-tests, with flash-point detector & temperature probe

Note! Flash-point results of milli test inserts may deviate from standard results.

Spare Parts

- 12-0778 **Electric Igniter** with connector cable and plugs
- 12-0509 **Gas Igniter** with 25 cm hose
- 12-0514 **Safety Detector** to control gas igniter and external inflammation
- 12-0600 **Tray** for cup and multi-detector
Note: Available as an option for all TAG 4 units built before 05/2004.
- 12-0790 **Tong** for safe handling of hot handleless test cups
- 12-0791 **Stopper**, brass (Ø 18 mm), to close the multi-detector opening of the cover before use



12-0600



Scope of Application

The TAG method describes the flash-point determination of liquids with a viscosity below 5.5 mm²/s (cSt) at +40°C (104°F) or below 9.5 mm²/s (cSt) at +25°C (77°F) and a flash-point below +93°C (200°F).

This method can indicate the possible presence of highly volatile and flammable materials in a relatively nonvolatile or nonflammable material.

For example, an abnormally low flash-point on a sample of kerosene can indicate gasoline contamination.

Summary of Method

A brass test cup is filled to the inside mark with test specimen, fitted with a cover and heated. An ignition source is directed into the test cup at regular intervals until a flash is detected.

Temperature Range:
+5°C ... +70°C

Flash-Point Testing with Closed Cup acc. TAG (semi-automatic)

TAG Method:

ASTM D 56 - FTM 791-1101 - JIS K2265

Equilibrium Method (Flashpoint):

(IP 304-1)

Equilibrium Method (Flash/no Flash):

(IP 304-2)

Main Units

Semi-Automatic Flash-Point Tester, TAG Method

TAG Method: ASTM D 56 - FTM 791-1101 - JIS K2265

Equilibrium Method: (IP 304-1)

(flash/no flash) (IP 304-2)

Consisting of:

water bath with regulated electric heater and cooling coil for connection of an external cooler

Supplied with:

- 1 cup
- 1 cover
- 2 thermometers ASTM 57C
- 2 thermometers ASTM 9C/IP 15C

Note: pre-regulating valve for gas is recommended

Technical Data:

Temperature range : +5 to +70 °C (+41 to +158 °F)

Ignition : gas

Dimensions : 180 x 200 x 205 mm (W x D x H), weight: 6 kg

12-1520

Power supply: 230 V, 50/60 Hz, 600 W

12-1521

Power supply: 110 V, 50/60 Hz, 600 W (115 V available upon request)



Options & Accessories

12-0052 **Pipette**, 25 ml

12-0629 **Pre-Regulating Valve** for gas supply with hose adapter, suitable for all types of burning gases

50-5172 **Clip** (Hoffmann type) for regulation of gas stream

50-9114 **Reference Liquid "ASTM D 56"** (approx. +47°C), 255 ml
Note: Requires special shipment as hazardous goods

12-1750 **Digital Precision Barometer**, 0 to 1300 mbar : 1 mbar

12-1751 **Case** for barometer

12-1752 **Certificate** for barometer with: **5 measuring points**

12-1753 **Certificate** for barometer with: **10 measuring points**

12-1754 **Battery** 9-V-Block, for barometer



12-0052



12-1286

Thermometer

Precision Made	Officially Certified	Type		Range
		ASTM	IP	
12-1533 12-0569	12-0579	57C	-	-20 to + 50 : 0.5°C (for cup)
12-0570	12-0580	57F	-	-4 to + 122 : 1°F (for cup)
12-1532 12-0683	12-0689	9C	15C	-5 to + 110 : 0.5°C (for bath)
12-0684	12-0690	9F	15F	+20 to + 230 : 1°F (for bath)

Spare Parts

12-1524 **Cup "TAG"**

12-1525 **Cover "TAG"** with gas igniter

12-1526 **Thermometer Collar**, Ø 12 mm

12-1286 **Thermometer Depth Gauge**

Heater

12-1528 Power supply: 230 V

12-1529 Power supply: 115 V

User Groups:

Fuel, Gasoline, Jet Fuel, Kerosene, Mastics, Paint, Regulatory Authorities, Solvent, Turbine Fuel, Varnish



Flash-Point Testing with Open Cup acc. TAG (semi-automatic)

ASTM D 3143 (AASHTO T 79)

ASTM D 1310 (not the whole range)

Temperature Range:
up to +93°C



Main Unit

Semi-Automatic Flash-Point Tester, TAG Method

ASTM D 1310 - ASTM D 3143

Consisting of:

stainless steel housing, bath with electric heater, electrically driven sweep arm for the test flame application

Supplied with: 1 open glass cup

Note: pre-regulating valve for gas or LPG-gas tank and thermometer are required.

Technical Data:

Temperature range : ... to +93 °C (... to +199 °F)

Ignition : gas

Dimensions : 31 x 29 x 33 cm (W x D x H), weight: 6 kg

12-1540 Power supply: 220-240 V, 50/60 Hz, 500 W (110-120 V, 60 Hz available upon request)

Options & Accessories

12-0629 **Pre-Regulating Valve** for gas supply with hose adapter, suitable for all types of burning gases

12-1250 **Gas Tank** (portable and refillable)
Consisting of: built-in on/off switch, igniter and stand
Supplied with: 1 m gas tubing

Note: To be filled by using any standard gas lighter refill cartridge. We highly recommend to buy the LPG - refill container locally, because it would require special shipment as hazardous goods.

50-9114 **Reference Liquid "ASTM D 56"** (approx. +47°C), 255 ml
Note: Requires special shipment as hazardous goods.

Thermometer

Precision Made	Officially Certified	Type ASTM	Range
12-0683	12-0689	9C	-5 to + 110 : 0.5°C (for bath)
12-0684	12-0690	9F	+20 to + 230 : 1°F (for bath)
13-0161	13-0162	33C	-38 to + 42 : 0.2°C (for cup)
90-0141	90-1141	33F	-36.5 to + 107.5 : 1°F (for cup)

Scope of Application

For Flash- and Fire-Point measurements of liquids having **flash-points** between -18 and +165°C (0 and 325°F) and **fire-points** up to +165°C according to ASTM D 1310 and of cutback asphalt having **flash-points** below +93°C according to ASTM D 3143.

Flash-point and fire-point of a liquid are used to define their flammability hazards.

Summary of Method

The specimen is placed in the cup of a Tag Open-Cup Apparatus and heated at a slow, but constant rate. A small test flame is passed at a uniform rate across the cup at specified intervals until a flash occurs.

The **flash point** is the lowest temperature at which the vapor at the liquid surface will flash.

For the **fire point**, the test is continued until the test flame causes the specimen to ignite and burn for at least 5 s.



12-0629



12-1250

Spare Parts

12-1542 **Cup**, made of glass

12-0109 **Silicone Tubing**, 4 m

User Groups:

Bitumen, Engine Oil, Mastics, Paint, Regulatory Authorities, Varnish



Scope of Application

The flash-point determination of petroleum products is using:

Method A:

for distillate fuels (diesel, kerosene, heating oil, turbine fuels), new lubricating oils, paints, varnishes and other homogeneous liquids.

Method B:

for residual fuel oils, cutback residual, used lubricating oils, non-homogeneous materials like mixtures of petroleum liquids & solids, surface-film building petroleum liquids or liquids with a viscosity above 5.5 cSt at +40°C.

Used in shipping & safety regulations to define flammable and combustible materials.

Summary of Method

A brass test cup is filled to the inside mark with test specimen, fitted with a cover and heated, while the specimen is stirred at specified rates. An ignition source is directed into the test cup at regular intervals with simultaneous interruption of the stirring, until a flash is detected.

The **FLASH-POINT** is the lowest temperature at which the application of an ignition source causes the specimen vapors to ignite.

Flash-Point Testing with Closed Cup acc. Pensky-Martens - PMA 4 (automatic)

Pensky-Martens Method:

ASTM D 93-A&B - JIS K2265
AASHTO T73-A&B - AASHTO T172-A&B
FTM 791-1102 - FTM 141-4293
IP 34-A&B (BS 2839)
ISO 2719-A&B
(EN 22 719, DIN 51 758, NF M07-019)

Diesel Fuel Blend Stock Option (Biodiesel):

ASTM D 6751

Limit Test (eatable oils & fats):

ISO 15 267 - BS 684-1.17



PMA 4 without Fire-Extinguishing Device
(Test-Insert included)
(12-1770)



PMA 4 with Fire-Extinguishing Device
(Test-Insert included)
(12-1767)

Easy to Operate

The **PMA 4** is equipped with a large LC-display visible up to 10 m distance and the **multi-function-head - ONE-TWIST**.

All the operator has to do is:

- insert the filled test cup, complete with the lid and multi-detector
- swing the **multi-function-head** into test position and all electrical connections are carried out automatically, including the coupling of the stirring motor
- select one of the 14 test methods
- set the expected flash-point
- if desired, enter a sample ID

If the last 3 characters of a sample ID are digits, the **PMA 4** will automatically count forward in the series for the following measured samples.

Further the **PMA 4** has an internal memory, where the last 4 tests with its parameters and 99 measured values are stored.

Even better:

use PC-Software "**PMANet**" for easy handling, storing of data, as well as for program transfer from PC to PMA 4. Easy to read tableau. Permanent indication of test status. Results can be stored in the memory and transferred into Excel etc. Numerous programs can easily be set, copied from the memory and modified. Graphical display of sample & block temperature, as well as temperature gradient.

Temperature Range:

approx. +40°C ... +360°C

User Groups:

Biodiesel, Bitumen, Engine Oil, Fuel, Jet Fuel, Lube Oil, Mastics, Paint, Power Plant, Regulatory Authorities, Solvent, Turbine Fuel, Turbine Oil, Varnish



electric igniter

Reliable and Precise

The operator of the **PMA 4** has the choice to either apply a gas flame or an electrical igniter for each flash test, as the **PMA 4** is equipped with both as a standard feature.

Un-interrupted burning of the gas flame is controlled and if necessary a blown off flame is automatically re-lit.

Since the flash-point temperature is dependent upon the local barometric pressure, **PMA 4** measures the barometric pressure during the flash and makes an automatic correction.

To be sure that the Pt-100 probe for sample temperature measures and displays correctly, the **PMA 4** temperature indication can be checked using a special probe verification program, in conjunction with a special test lid and a certified thermometer (available accessories).

Operational Safety

The **PMA 4** is equipped with multiple sensors which monitor the proper functioning of this instrument. One sensor continually checks the performance of the electric igniter. Outside of control limits, possibly due to excessive ageing or damage, a "Change Igniter" warning is displayed.

The **PMA 4** also displays error messages if the first application of the igniter results in a flash-point being detected, or when no flash-point is detected at the end of a test program.

There are substances which do not have a flash-point in a closed cup. Their gases burn outside the sample cup. This will be detected and signaled, preventing an accident or damage.

Optional, the **PMA 4** is available with a fire-extinguishing device.

Multi-function-head - ONE-TWIST with its quick-coupling basically avoids touching the hot surfaces.

Versatility

In addition to the ASTM D 93 and ISO 2719, with their modifications for methods A and B or for samples with high or low viscosity, **PMA 4** provides two test programs which can be fully customized by the user.

Together with the wide measuring range (approximately +40 °C up to +360 °C) this offers a great versatility:

The user of the **PMA 4** is not bound to the standardized test methods only but can adapt the instrument to individual requirements. Such a problem exists, for instance, when measuring the flash-point of bitumen.

For example flash point measurements of Bitumen: One of the two user definable programs can be used to define the temperature where the stirrer begins to rotate or to which temperature the **PMA 4** cools down (e.g. +180 °C) after the test is finished. This prevents solidification of the test substance in the test cup and also saves time to warm up the sample to its melting-point.

Time Saving and Economical Operation

For samples with a high flash-point the RAPID-heating program heats at an accelerated rate of 8.5 K/min, until 30 K below the expected flash-point, when the heating rate is reduced to the standardized rate of 5 to 6 K/min.

Another time saving feature is the SEARCH program, which enables a quick determination of fully unknown samples. The approximate flash-point of a sample must be known to perform standardized flash-point measurements correctly. In the search mode the **PMA 4** heats the sample at 8.5 K/min and the igniter is automatically applied every 5 K.



gas igniter & electric auto-ignition device

Compact Design

The **PMA 4** occupies a bench-top area of only 23 cm wide and 47 cm in depth. Effectively using the work bench depth and not wasting the width.

Technical Data

Temperature Range:
approx. +40 to +360 °C

Programs: (acc. to international standards)
4x ASTM-Standards
4x ISO-Standards
2x Rapid-Heating
2x Search Run
2x User Defined

Ignition Type: (included)
gas & electric

Stirring Speed: (adjustable)
60 to 250 rpm

Sensing System:
differential-thermocouple

Barometric Pressure Sensor:
automatic correction of the measured values

Safety:
overheat protection
automatic shut-off

Hardware Clock: included

Interface:
RS232 (for printer)
RS232 (for computer download)
(USB-converter available)

Gas Connection:
for propane/butane or natural gas (max. 50 mbar)

Display: °C / °F (selectable)
high x wide: 56 x 90 mm
digit size : 25 mm

Dimensions:
Width 230 mm
Depth 470 mm
Height 460 mm
Weight 12 kg

Power Consumption:
approx. 900 Watts

Power Supply: (selectable)
230/115 V, 50/60 Hz



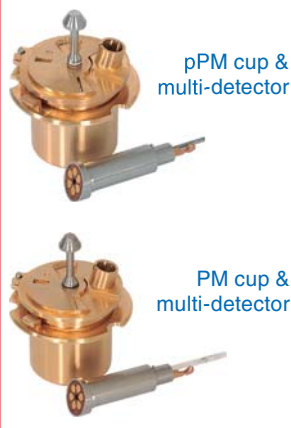
12-1770

pPM - Cup

This is a special test insert with a volume of approx. 15 ml for cases, where a small sample volume is available only (Milli-Test-Insert).

Although this cup does not comply with the official standards, experiments have shown that in many cases and even with a sample volume of only 2 ml, good reproducibility and test results can be achieved which agree well with those measuring strictly according to the standards.

The **pPM-cup** extends the application of the **PMA 4** to a domain where only small sample quantities are available, e.g. cosmetics industry with very expensive perfume oils.



pPM cup & multi-detector

PM cup & multi-detector



12-1763

PMA - Single Place Units

PMA 4 - Automatic Flash-Point Tester, Pensky-Martens Method

Pensky-Martens Method: ASTM D 93-A&B - JIS K2265
FTM 791-1102 - FTM 141-4293
AASHTO T73-A&B - AASHTO T172-A&B
IP 34-A&B (BS 2839)
ISO 2719-A&B (EN 22719, DIN 51 758, NF M07-019)

Biodiesel Method: ASTM D 6751

Limit Test (eatable oils & fats): ISO 15 267 - BS 684-1.17

Features:

- swivel-around multi-function-head - ONE TWIST
- automatic barometric pressure correction
- 2 user definable test programs
- suitable for Milli-test insert with a volume of approx. 15 ml
- PC-software

Consisting of:

stainless steel housing with two-color powder coating, touch-key panel with large LC-display (visible in up to 10 m distance), swivel-mounted multi-function-head - ONE-TWIST, two RS232-interfaces for data printer and computer connection, different test-programs, data-transfer and software upgrading through bi-directional interface, automatic barometric pressure correction, automatic overheat protection, power controlled/monitored electric igniter, gas igniter with auto-relighting and safety shut-off, re-cooling fan.

PC-Software "PMANet" (Windows® compatible):

for easy handling, storing of data, as well as program transfer from PC to PMA 4.

Easy to read tableau. Permanent indication of test status.

Results can be stored in the memory and transferred into Excel etc.

Numerous programs can easily be set, copied from the memory and modified.

Due to the most comfortable ability of this software to display and modify actual and future test

sequences, it is most recommendable for samples of permanently changing characteristics.

Graphical display of sample & block temperature, as well as temperature gradient.

Supplied with:

- 1 cup "PM"
- 1 cover "PM"
- 1 multi-detector "PM"
- 1 gas igniter
- 1 electric igniter
- 1 tong for cup
- 1 tray for cup and multi-detector
- 1 stirrer coupling
- 1 PC-software "PMANet"

Temperature Range: **+40 to +360 °C** (+104 to +680 °F)

12-1770 Power supply: 115/230 V, 50/60 Hz, EU-plug

12-1771 Power supply: 115/230 V, 50/60 Hz, US-plug

PMA 4 F - Automatic Flash-Point Tester, Pensky-Martens Method with Fire-Extinguishing Device

Consisting of:

see Standard Unit (12-1770), but with automatic fire-suppression system for connection to external Nitrogen- or Carbon Dioxide supply.

Software (Windows®): see Standard Unit (12-1770)

Supplied with: see Standard Unit (12-1770)

12-1767 Power supply: 115/230 V, 50/60 Hz, EU-plug

12-1768 Power supply: 115/230 V, 50/60 Hz, US-plug

Options & Accessories

12-0782 **Calibration Set "PMA/PM"**

Consisting of:

- 1 calibration cover,
- 1 thermometer ASTM 9C/IP 15C,
- 1 thermometer ASTM 10C/IP 16C

12-1762 **Calibration-Adapter** for Pt-100 in multi-detector

12-0793 **Handle** for permanent fixing at the cup

12-1508 **Draft Deflector** (recommended for gas ignition tests)

12-1509 **Stand** to hold 12 multi-detectors

12-1763 **Storage Box** for spare parts and tools



Options & Accessories continued

- 50-9024 Reference Liquid (Gas Oil)** with certificate, 500 ml, range: approx. +56°C to +80°C
Note: Requires special shipment as hazardous goods
- 50-9110 Reference Liquid "ASTM D 93"** (approx. +65 °C), 255 ml
Note: Requires special shipment as hazardous goods.
- 50-9113 Reference Liquid "ASTM D 93"** (approx. +60.8 °C), 250 ml
Note: Requires special shipment as hazardous goods.
- 50-9112 Reference Liquid "ASTM D 93"** (approx. +213 °C), 250 ml
- 25-0804 Computer** with 17" monitor (detailed specifications upon request)
Power supply 230 V, 50 Hz
- 11-0599 USB/RS232-Converter** (verified for petrotest@-units) with 2 m cable connecting 1 serial port with the USB-port of a PC or Hub
- Serial Impact Printer** for single sheet & continuous paper with USB-interface to record data like test results, duration of test, etc. (instead of a PC)
Supplied with: 1 data transmission cable, 1 ink ribbon (black)
- Technical Data:
Line spacing : 80 characters per line (10 cpi)
Page size (W x H) : 257x364 mm (sheet), 254x558.8 mm (roll)
Ports : serial, USB (1.1) & parallel
Dimensions : 37 x 28 x 16 cm (WxDxH), weight 5 kg
- 25-0282 Power supply** : 220/240 V, 50/60 Hz
25-0283 Power supply : 100/130 V, 50/60 Hz



11-0599



25-0282



12-0777

Test Inserts

Standard Brass Test Equipment:

- 12-0777 Standard Test Insert "PM"** (incl. in PMA4)
Consisting of:
1 cover and 1 cup (standard dimensions, made of brass)
- 12-0785 Standard Cup "PM"**, approx. 75 ml (with filling mark), made of brass
- 12-0786 Standard Cover "PM"**, with shutter assembly, made of brass
- 12-0787 Standard Multi-Detector "PM"**
with flash-point detector (thermocouple) and temperature probe, made of glass



12-1790

Stainless Steel Test Equipment:

- 12-1790 Test Insert "PM-NIRO"**
Consisting of:
1 cover and 1 cup (standard dimensions, made of stainless steel)
- 12-1791 Cup "PM-NIRO"**, approx. 75 ml (with filling mark), made of stainless steel
- 12-1792 Cover "PM-NIRO"**, with shutter assembly, made of stainless steel
- 12-0784 Multi-Detector "PM-NIRO"**
with flash-point detector (thermocouple) and temperature probe, made of stainless steel



12-1777

Milli Test Equipment (for small sample amounts):

- 12-1777 Milli Test Insert "pPM"**
Consisting of:
1 cover and 1 cup (sample quantity 2 to 15 ml, ideal 7 ml), made of brass
- 12-1785 Milli Cup "pPM"**, approx. 15 ml, made of brass
- 12-1786 Milli Cover "pPM"**, with shutter assembly, made of brass
- 12-1787 Milli Multi-Detector "pPM"**
with flash-point detector (thermocouple) and temperature probe, made of stainless steel

Note! Flash-point results of NIRO & pPM test inserts may deviate from standard results.

Spare Parts

- 12-0600 Tray** for cup and multi-detector
Note! Available as an option for all PMA 4 units built before 05/2004.
- 12-0790 Tong** for handling the hot test cup
- 12-0778 Electric Igniter**
with connector cable and plugs
- 12-0779 Gas Igniter** with 20 cm hose
12-0781 Gas Supply Tubing, 1 meter
- 12-0788 Safety Detector** to control gas igniter and external inflammation
- 12-0780 Stirrer Couplings**, pack of 10,
12-1507 for units built until 12/2001
for units built since 1/2002
- 12-0791 Stopper**, brass (Ø 18 mm), to close the multi-detector opening of the cover



12-0600



Technical Data

Temperature Range:

PMA & Sampler:

approx. +40 to +360°C

PMA & Chilled Sampler:

below +40 to +360°C

Programs: (acc. to international standards)
4x ASTM-Standards
4x ISO-Standards
2x Rapid-Heating
2x Search Run
2x User Defined

Ignition Type: (included)
gas & electric

Stirring Speed: (adjustable)
60 to 250 rpm

Sensing System:
differential-thermocouple

Barometric Pressure Sensor:
automatic correction of the measured values

Safety:
overheat protection
automatic shut-off

Hardware Clock: included

Interface:
RS232 (for printer)
RS232 (for computer download)
(USB-converter available)

Gas Connection:
for propane/butane or natural gas (max. 0.05 bar)

Display: °C / °F (selectable)
large LCD

Dimensions:

PMA & Sampler:

Width 650 mm
Depth 470 mm
Height 650 mm
Weight ~ 35 kg

PMA & Chilled Sampler:

Width 1000 mm
Depth 470 mm
Height 650 mm
Weight ~ 66 kg

Power Consumption:
approx. 900 Watts

Power Supply: (selectable)
230/115 V, 50/60 Hz

Flash-Point Testing with Closed Cup acc. Pensky-Martens - PMA 4 with Sample Changer (automatic)

Pensky-Martens Method:

ASTM D 93-A&B - JIS K2265
FTM 791-1102 - FTM 141-4293
AASHTO T73-A&B - AASHTO T172-A&B
IP 34-A&B (BS 2839)
ISO 2719-A&B
(EN 22 719, DIN 51 758, NF M07-019)

Biodiesel:

ASTM D 6751

Limit Test (eatable oils & fats):

ISO 15267 - BS 684-1.17

PMA 4 Sample Changer
with Fire-Extinguisher
(12-2772 & 6 Test Inserts)



The Automatic Sample Changer

As an exceptionally time and cost saving alternative, the **PMA 4** is available with an automatic sample changing device.

This sample changer carousel can carrying a **maximum of 12 test cups**.

The device is **controlled by the PMA 4**, still the use of a **PC is highly recommended**.

The PMA 4 is supplied with a **Windows-software-package incl. "Quick Run"**. Under full compliance with the standards this software is able to increase the performance of this instrument by up to 50 % compared with conventional automated testers.

The instrument is small enough to fit into a fume-hood.

The **Sample Changer** is available as a **standard-version (12-2770/1)** and **with Fire-Extinguisher (12-2772/3)**.



Transfer arm with test insert

The Sample Changer with Sample-Cooling

It is equipped like the standard-version, but **with insulating cover and coolant circulator**.

The carousel is made out of a two-layer metal block with internal heat exchanger coil to stabilize the temperature to a level deviating from the ambient temperature.

An **acrylic-glass cover** is designed to reduce the loss of cooling energy.

A **coolant circulator** is supplied **with insulates hoses** and connected to the sample changer to keep the temperature in the samples at approx. +4 °C (ambient not exceeding +24 °C).

The **Sample Changer** is available as a standard-version **with cooling (12-2776/7)** and **with Fire-Extinguisher (12-2778/9)**.

Scope

User Groups

Options & Accessories

Test Inserts

Spare Parts

see PMA single-place unit
(page 16-19)



PMA & Sample Changer (with 12-place carousel)

PMA 4 S - Automatic Flash-Point Tester, Pensky-Martens Method with Sample Changer

Pensky-Martens Method: ASTM D 93-A&B - JIS K2265
FTM 791-1102 - FTM 141-4293
AASHTO T73-A&B - AASHTO T172-A&B
IP 34-A&B (BS 2839)
ISO 2719-A&B (EN 22719, DIN 51 758, NF M07-019)

Biodiesel Method: ASTM D 6751
Limit Test (eatable oils & fats): ISO 15 267 - BS 684-1.17

Features:

- for up to 12 samples
- suitable for Standard "PM" (72 ml) & Milli-test inserts "pPM" (< 15 ml)
- PMA4 with "Sample Changer"- firmware

Consisting of:

PMA 4 in a high-grade stainless steel housing with two-color powder coating, touch-key panel and large LC-display, swivel-mounted multi-function-head - ONE-TWIST, two RS232-interfaces for data printer and computer connection, different test-programs, data-transfer and software upgrading through bi-directional interface, automatic barometric pressure correction, automatic overheat protection, power controlled/monitored electric igniter, gas igniter with auto-relighting and safety shut-off, re-cooling fan.

Sample Changer with 12-place carousel, transfer arm with housing and positioning devices.

PC-Software "PMANet" (Windows® compatible):

for easy handling, storing of data, as well as program transfer from PC to PMA 4. Easy to read tableau. Permanent indication of test status. Results can be stored in the memory and transferred into Excel etc. Numerous programs can easily be set, copied from the memory and modified. Due to the most comfortable ability of this software to display and modify actual and future test sequences, it is most recommendable for samples of permanently changing characteristics. Graphical display of sample & block temperature, as well as temperature gradient.

When using the auto-sampler the software is also able to use the result of the previous test as the estimated flashpoint for the next test automatically. Important for unknown samples.

Including the **module "Quick Run"**, especially useful in connection with the sample changer. The re-cooling time is optimized in relation to the next consecutive sample. Rationalization of up to 50% becomes possible. Full compliance with standards is ensured.

Supplied with: 1 gas igniter, 1 electric igniter, 1 tong for cup, 1 stirrer coupling, 1 PC-software "PMANet" (incl. "QuickRun")

To be ordered separately: cups, covers & multi-detectors (e.g. 12-0777 & 12-0787)

Temperature Range: **+40 to +360 °C** (+104 to +680 °F)

Power supply: 115/230 V, 50/60 Hz, EU-plug

Power supply: 115/230 V, 50/60 Hz, US-plug

12-2770
12-2771

PMA 4 FS - Automatic Flash-Point Tester, Pensky-Martens Method with Fire-Extinguishing Device & Sample Changer

Consisting of:

see Standard Unit (12-2770/1), but with automatic fire-suppression system for connection to external Nitrogen- or Carbon Dioxide supply.

Power supply: 115/230 V, 50/60 Hz, EU-plug

Power supply: 115/230 V, 50/60 Hz, US-plug

12-2772
12-2773

PMA & Chilled Sample Changer (with chilled 12-place carousel)

PMA 4 SC - Automatic Flash-Point Tester, Pensky-Martens Method with Chilled Sample Changer

Consisting of:

see Standard Unit (12-2770/1), but with insulating cover and coolant circulator with tubing.

The carousel is made out of a two-layer metal block with an internal heat exchanger coil to stabilize the temperature to a level deviating from the ambient temperature. An acrylic-glass cover is designed to reduce the loss of cooling energy.

A mechanically refrigerated coolant circulator is used as a source of cooling energy to keep the temperature in the samples at approx. +4 °C (ambient not exceeding +24 °C).

Connecting tubes are insulated.

Power supply: 115/230 V, 50/60 Hz, EU-plug

Power supply: 115/230 V, 50/60 Hz, US-plug

12-2776
12-2777

PMA 4 FSC - Automatic Flash-Point Tester, Pensky-Martens Method with Fire-Extinguishing Device & Chilled Sample Changer

Consisting of:

see Standard Unit (12-2770/1), but with automatic fire-suppression system, insulating cover and coolant circulator with tubing.

Power supply: 115/230 V, 50/60 Hz, EU-plug

Power supply: 115/230 V, 50/60 Hz, US-plug

12-2778
12-2779

Temperature Range:
approx. **+40°C ... +360°C**



*PMA 4 Sample Changer
(Test Inserts not included)
(12-2770)*



*with Fire-Extinguisher
(12-2772 & 12-2773)*



*Chilled PMA 4 Sample Changer
(Test Inserts not included)
(12-2776)*

Temperature Range:
below **+40°C ... +360°C**



Scope of Application

The flash-point determination of petroleum products is using:

Method A:

for distillate fuels (diesel, kerosene, heating oil, turbine fuels), new lubricating oils, paints, varnishes and other homogeneous liquids.

Method B:

for residual fuel oils, cutback residual, used lubricating oils, non-homogeneous materials like mixtures of petroleum liquids & solids, surface-film building petroleum liquids or liquids with a viscosity above 5.5 cSt at +40°C.

Used in shipping & safety regulations to define flammable and combustible materials.

Summary of Method

A brass test cup is filled to the inside mark with test specimen, fitted with a cover and heated, while the specimen is stirred at specified rates. An ignition source is directed into the test cup at regular intervals with simultaneous interruption of the stirring, until a flash is detected.

The **FLASH-POINT** is the lowest temperature at which the application of an ignition source causes the specimen vapors to ignite.



12-0600

Temperature Range:
approx. +40°C ... +360°C



12-0777

User Groups:

Biodiesel, Bitumen, Engine Oil, Fuel, Jet Fuel, Lube Oil, Mastics, Paint, Power Plant, Regulatory Authorities, Solvent, Turbine Fuel, Turbine Oil, Varnish

Flash-Point Testing with Closed Cup acc. Pensky-Martens - PMP 4 (semi-automatic)

Pensky-Martens Method:

- ASTM D 93-A&B - JIS K2265
- AASHTO T73-A&B - AASHTO T172-A&B
- FTM 791-1102 - FTM 141-4293
- IP 34-A&B (BS 2839)
- ISO 2719-A&B
- (EN 22 719, DIN 51 758, NF M07-019)

An economy-priced alternative to fully automatic flash-point testers on one hand and a remarkable ease in operation compared to manual instruments on the other hand.

Barometric Pressure Correction

The **PMP 4** has a built-in pressure sensor which measures the barometric pressure at the place where the flash tests are performed (e.g. in a fume hood and not anywhere in the laboratory).

With the cursor on the flash-point temperature, activate ENTER and the corrected flash-point temperature will be indicated.

Easy to manipulate

- Select one of the 14 pre-programmed test methods and enter the Estimated Flash-Point.
- Fill the sample into the test cup and insert the temperature probe.
- Shift the Test Head into test position and, if necessary, ignite test flame
- Strike RUN-key.

The apparatus now controls the warming up of the sample and also automatically applies the test flame as prescribed by the standard. The operator can fully concentrate himself to the observation of a flash.

Actuating the STOP key terminates the test and the flash-point can be noted from the display

The **PMP 4** covers an operating span from approx. +40 °C to +360 °C (+104 °F to +680 °F).

If the samples are pre-cooled externally, flash-points can be measured even down to about +20 °C (+68 °F).

The reading accuracy will be 0.1 Kelvin.

For reasons of safety, the **PMP 4** has an "Excess-Temperature-Protection" which will switch off the instrument 20 Kelvin above the previously entered estimated flash-point.



gas-ignition & gas auto-ignition device

Diesel Fuel Blend Stock Option (Biodiesel):
ASTM D 6751

Limit Test (eatable oils & fats):
ISO 15 267 - BS 684-1.17



14 Test Methods stored in the PMP 4:

8 standardized methods according to ASTM D 93, method A & B, and ISO 2719, method A & B; each for high or low viscosity samples.

2 RAPID heating programs, which allow examination of samples with a very high flash-point in a time saving and more economic manner. The sample will be heated at a rate of 8 K/min until 30 K below the estimated flash-point when the heating rate is reduced to the standard rate of 5 to 6 K/min.

2 SEARCH modes for quick determination of the expected flash-point of truly unknown samples. The sample is heated with 8.5 K/min and the igniter is automatically applied every 5 K.

2 USER programs are very useful because the operator is able to adapt the instrument to his individual requirements. It is, for example, possible to set up a special bitumen test where the instrument does not re-cool to ambient temperature but to only +180 °C. This saves time and energy.

PMP 4 stores the last 4 program settings under a sample name. This is most convenient if similar products are examined. Just by striking a key, recall the suitable setting from this program library and the apparatus will be prepared for the next test.



Main Unit

12-0595 PMP 4 - Semi-Automatic Flash-Point Tester, Pensky-Martens Method (Automatic Ramp Control)

Pensky-Martens Method: ASTM D 93-A&B - JIS K2265 - FTM 791-1102 - FTM 141-4293
AASHTO T73-A&B - AASHTO T172-A&B - IP 34-A&B (BS 2839)
ISO 2719-A&B (EN 22719, DIN 51 758, NF M07-019)

Biodiesel Method: ASTM D 6751
Limit Test (eatable oils & fats): ISO 15 267 - BS 684-1.17

Features:

- automatic Barometric Pressure Correction
- easy to manipulate
- automatic overheat protection
- 14 programs (acc. to standard, Search-, RAPID-, user-definable programs)

Consisting of:

stainless steel housing with two-color powder coating, touch-key panel with large LC-display, swivel-mounted head, automatic barometric pressure correction, automatic overheat protection, heating control, electric stirrer adjustable from 60 rpm to 250 rpm, automatic stirrer shut-off during dipping of igniter and 14 programs (acc. Standard-, Search-, RAPID- & user-definable methods)

Supplied with:

- 1 cup "PM"
- 1 cover "PM"
- 1 temperature probe Pt-100
- 1 tong for cup
- 1 tray for cup
- 1 stirrer coupling

Temperature Range: **+40 to +360 °C** (+104 to +680 °F)

Power supply: 115/230 V, 50/60 Hz (selectable)

Options & Accessories

12-0782 Calibration Set "PMA/PM"

Consisting of:

- 1 calibration cover,
- 1 thermometer ASTM 9C/IP 15C,
- 1 thermometer ASTM 10C/IP 16C

12-0793 **Handle** for permanent fixing at the cup

12-1508 **Draft Deflector** (recommended for gas ignition tests)

12-1763 **Storage Box** for spare parts and tools

50-9110 **Reference Liquid "ASTM D 93"** (approx. +65 °C), 255 ml
Note: Requires special shipment as hazardous goods.

50-9113 **Reference Liquid "ASTM D 93"** (approx. +60.8 °C), 250 ml
Note: Requires special shipment as hazardous goods.

50-9112 **Reference Liquid "ASTM D 93"** (approx. +213 °C), 250 ml

Test Inserts

12-0777 Standard Test Insert "PM" (incl. in PMP4)

Consisting of:

- 1 cup and 1 cover
(standard dimensions, made of brass)

12-0785 **Standard Cup "PM"**, approx. 75 ml, made of brass

12-0786 **Standard Cover "PM"**
for standard cup with shutter assembly, made of brass

Spare Parts

12-0599 **Temperature Probe** Pt-100

12-0600 **Tray** for cup
Note! Available as an option for all PMP 4 units built before 05/2004.

12-0790 **Tong** for safe handling of hot test cup

12-0779 **Gas Igniter** with 20 cm hose

12-0781 **Gas Supply Tubing**, 1 meter

12-0780 **Stirrer Couplings**, pack of 10,
for units built until 12/2001

12-1507 for units built since 1/2002

Technical Data

Temperature Range:
approx. +40 to +360 °C

Programs: (acc. to international standards)
4x ASTM-Standards
4x ISO-Standards
2x Rapid-Heating
2x Search Run
2x User Defined

Ignition Type: gas

Stirring Speed: (adjustable)
60 to 250 rpm

Sensing System: --

Barometric Pressure Sensor:
automatic correction of the measured values

Safety:
overheat protection
automatic shut-off

Hardware Clock: included

Interface: --

Gas Connection:
for propane/butane or natural gas (max. 50 mbar)

Display: °C / °F (selectable)
high x wide: 56 x 90 mm
digit size : 25 mm

Dimensions:
Width 230 mm
Depth 470 mm
Height 460 mm
Weight 12 kg

Power Consumption:
approx. 900 Watts

Power Supply: (selectable)
230/115 V, 50/60 Hz



12-1508



12-1763



Scope of Application

The flash-point determination of petroleum products is using:

Method A:

for distillate fuels (diesel, kerosene, heating oil, turbine fuels), new lubricating oils, paints, varnishes and other homogeneous liquids.

Method B:

for high viscous materials, residual fuel oils, cutback residual, used lubricating oils, non-homogeneous materials like mixtures of petroleum liquids & solids, surface-film building petroleum liquids or liquids with a viscosity above 5.5 cSt at +40°C.

Used in shipping & safety regulations to define flammable and combustible materials.

Summary of Method

A brass test cup is filled to the inside mark with test specimen, fitted with a cover and heated, while the specimen is stirred at specified rates. An ignition source is directed into the test cup at regular intervals with simultaneous interruption of the stirring, until a flash is detected.

The **FLASH-POINT** is the lowest temperature at which the application of an ignition source causes the specimen vapors to ignite.

Technical Data

Temperature Range:
approx. +40 to +360 °C

Programs: --

Ignition Type: (included)
gas & electric

Stirring Speed: (selectable)
120 or 250 rpm

Sensing System:
differential-thermocouple

Barometric Pressure Sensor: --

Safety:
overheat protection
automatic shut-off

Hardware Clock: --

Interface: --

Gas Connection:
for propane/butane or
natural gas (max. 0.05 bar)

Display: --

Dimensions:
Width 230 mm
Depth 470 mm
Height 460 mm
Weight 10 kg

Power Consumption:
approx. 850 Watts

Power Supply:
230 or 115 V, 50/60 Hz

User Groups:

Biodiesel, Bitumen, Engine Oil, Fuel, Jet Fuel, Lube Oil, Mastics, Paint, Power Plant, Regulatory Authorities, Solvent, Turbine Fuel, Turbine Oil, Varnish

Flash-Point Testing with Closed Cup acc. Pensky-Martens

- PM 4 (semi-automatic)

Pensky-Martens Method:

ASTM D 93-A&B - JIS K2265
AASHTO T73-A&B - AASHTO T172-A&B
FTM 791-1102 - FTM 141-4293

IP 34-A&B (BS 2839)

ISO 2719-A&B
(EN 22 719, DIN 51 758, NF M07-019)

Diesel Fuel Blend Stock Option (Biodiesel):
ASTM D 6751

Limit Test (eatable oils & fats):
ISO 15 267 - BS 684-1.17

Temperature Range:
approx. +40°C ... +360°C



Main Unit

PM 4 - Semi-Automatic Flash-Point Tester, Pensky-Martens Method

Pensky-Martens Method: ASTM D 93-A&B - JIS K2265
AASHTO T73-A&B - AASHTO T172-A&B
FTM 791-1102 - FTM 141-4293
IP 34-A&B (BS 2839)
ISO 2719-A&B (EN 22719, DIN 51 758, NF M07-019)

Biodiesel Method: ASTM D 6751
Limit Test (eatable oils & fats): ISO 15 267 - BS 684-1.17

Features:
- easy to manipulate
- automatic overheat protection
- gas and electric igniter

Consisting of:
stainless steel housing with two-color powder coating, swivel-mounted head, automatic overheat protection, electric heating, electronic heater control, electric stirrer 120 rpm (method A) and 250 rpm (method B) and automatic stirrer shut-off during dipping of igniter, re-cooling fan

Supplied with:
1 cup "PM"
1 cover "PM"
1 gas igniter
1 electric igniter
1 handle for cup
1 stirrer coupling
1 thermometer ASTM 9C/IP 15C
1 thermometer ASTM 10C/IP 16C

Note: Stopper (12-0791) for thermometer opening is required.

Temperature Range: +40 to +360 °C (+104 to +680 °F)

12-1650 Power supply: 230 V, 50/60 Hz
12-1651 Power supply: 115 V, 50/60 Hz



Options & Accessories

- 12-1669** **Digital-Thermometer** alternative for glass-thermometers. Hold-key stops the display for easy storing of the Flash-Point, while the normal display runs further. This enables much more comfortable work with a PM-Flash-Point test. Measuring Range: up to +400°C

- 12-1750** **Digital Precision Barometer**, 0 to 1300 mbar : 1 mbar
- 12-1751** **Case** for barometer
- 12-1752** **Certificate** for barometer - **5 measuring points**
- 12-1753** **Certificate** for barometer - **10 measuring points**
- 12-1754** **Battery**, 9V-Block, for barometer

- 12-0600** **Tray** for cup
- 12-0790** **Tong** for handling hot handleless test cups
- 12-1508** **Draft Deflector** (recommended for gas ignition tests)
- 12-1763** **Storage Box** for spare parts and tools

- 50-9110** **Reference Liquid "ASTM D 93"** (approx. +65°C), 255 ml
(Note: Requires special shipment as hazardous goods.)
- 50-9113** **Reference Liquid "ASTM D 93"** (approx. +60.8°C), 250ml
(Note: Requires special shipment as hazardous goods.)
- 50-9112** **Reference Liquid "ASTM D 93"** (approx. +213°C), 250ml



12-1669



12-0600

Test Insert

- 12-0777** **Standard Test Insert "PM"** (incl. in PM4)
Consisting of: 1 cup and 1 cover (standard dimensions, made of brass)
- 12-0785** **Standard Cup "PM"**, approx. 75 ml, made of brass
- 12-0786** **Standard Cover "PM"** for standard cup with shutter assembly, made of brass
- 12-0791** **Stopper**, brass (Ø 18 mm), to close the thermometer opening of the cover before use



12-1763

Thermometer

Precision Made	Officially Certified	Type		Range
		ASTM	IP	
12-0657	12-0658	9C	15C	-5 to + 110 : 0.5°C
12-0659	12-0660	9F	15F	+20 to + 230 : 1°F
12-0661	12-0662	10C	16C	+90 to + 370 : 2°C
12-0663	12-0664	10F	16F	+200 to + 700 : 5°F
12-0665	12-0666	88C	-	+10 to + 200 : 1°C
12-0667	12-0668	88F	-	+50 to + 392 : 2°F



12-0777

Spare Parts

- 12-0793** **Handle** for permanent fixing at the cup
- 12-0778** **Electric Igniter** with connector cable and plugs
- 12-1507** **Stirrer Couplings** for units built since 1/2002, pack of 10
- 12-0779** **Gas Igniter** with 20 cm hose
- 12-0781** **Gas Supply Tubing**, 1 meter



12-0793



Scope of Application

The flash-point determination of petroleum products is using:

Method A:

for distillate fuels (diesel, kerosene, heating oil, turbine fuels), new lubricating oils, paints, varnishes and other homogeneous liquids.

Used in shipping & safety regulations to define flammable and combustible materials

Summary of Method

A brass test cup is filled to the inside mark with test specimen, fitted with a cover and heated, while the specimen is stirred at specified rates. An ignition source is directed into the test cup at regular intervals with simultaneous interruption of the stirring, until a flash is detected.

Temperature Range:

+40°C ... +360°C



12-0651

Technical Data

Temperature Range:
approx. +40 to +360 °C

Ignition Type: (included)
gas

Stirring
included: manual
optional: electric 100 rpm

Barometric Pressure Sensor: --

Gas Connection:
for propane/butane or natural gas (max. 0.05 bar)

Dimensions:
Width 170 mm
Depth 170 mm
Height 410 mm
Weight 5 kg

Heating: gas type



12-0671

User Groups:

Biodiesel, Bitumen, Engine Oil, Fuel, Jet Fuel, Lube Oil, Mastics, Paint, Power Plant, Regulatory Authorities, Solvent, Turbine Fuel, Turbine Oil, Varnish

Flash-Point Testing with Closed & Open Cup acc. Pensky-Martens

- PM (manual)

Pensky-Martens Closed Cup Method:

ASTM D 93-A - JIS K2265
AASHTO T73-A - AASHTO T172-A
FTM 791-1102 - FTM 141-4293

IP 34-A (BS 2839)

ISO 2719-A

(EN 22 719, DIN 51 758, NF M07-019)

Diesel Fuel Blend Stock Option (Biodiesel):

ASTM D 6751

Limit Test (eatable oils & fats):

ISO 15 267 - BS 684-1.17

PM Open Cup Method (Flash & Fire-Point)

with further accessories:

IP 35

Main Units

12-0601 PM - Manual Flash-Point Tester, Pensky Martens Method

Features:

- easy to manipulate
- gas igniter
- hand-operated stirrer is extendable by an electrical stirrer unit

Consisting of:

socket made of brass with three stand, heating inset for cup, air bath, universal gas burner, burner gauze, hand-operated stirrer

Supplied with:

- 1 cup
- 1 cover with gas igniter
- 1 handle for cup
- 1 thermometer ASTM 9C/IP 15C
- 1 thermometer ASTM 10C/IP 16C

Note:

The hand-operated stirrer is extendable by an electrical stirrer (12-0677).
Due to safety reasons a pre-regulating valve for gas as recommended (12-0629).

Technical Data:

Temperature range : approx. +40 to +360 °C (+104 to +680 °F)
Dimensions (height) : 41 cm, Ø 170 mm
Weight : 5 kg



Options & Accessories

12-0677 Electric Stirrer, 100 rpm
Supplied with: 1 base plate, 2 support rod, 1 boss head
Power supply: 240 V, 50/60 Hz

12-0681 Test Insert (IP 35)
Consisting of: cup and cover with ignition device

12-0629 Pre-Regulating Valve for gas supply with hose adapter, for all types of burning gases

12-0179 Coolant Module to re-cool up to start temperature, made of metal

50-9110 Reference Liquid "ASTM D 93" (approx. +65 °C), 255 ml
Note: Requires special shipment as hazardous goods.

50-9112 Reference Liquid "ASTM D 93" (approx. +213 °C), 250 ml

50-9113 Reference Liquid "ASTM D 93" (approx. +60.8 °C), 250 ml
Note: Requires special shipment as hazardous goods.

Thermometer

Precision Made	Officially Certified	Type		Range
		ASTM	IP	
12-0657	12-0658	9C	15C	-5 to + 110 : 0.5°C
12-0659	12-0660	9F	15F	+20 to + 230 : 1°F
12-0661	12-0662	10C	16C	+90 to + 370 : 2°C
12-0663	12-0664	10F	16F	+200 to + 700 : 5°F

Spare Parts

12-0651 Test Insert "PM-gas" (incl. in PM)

Consisting of:

- 1 cup "PM"
- 1 cover with gas igniter
- 1 mechanical stirrer
- 1 thermometer ASTM 9C/IP 15C

12-0669 Cover "PM" with gas igniter (for all gas types)

12-0671 Cup "PM", 72 ml

12-0172 Handle for lifting up the cup

12-0656 Mechanical Stirrer

12-0176 Burner Gauze

11-0110 Universal Gas Burner for butane, propane, town & natural gas

50-5172 Clip (Hoffmann type) for regulation of gas stream



Flash-Point Testing with Closed Cup - Army Ceck (manual)

similar to Pensky-Martens-Type



Scope of Application

The delivery specifications of a sample state the minimum values for the flash-point.

If the actual flash-point drops below these limits, it is an indication for contamination of the liquid with higher flammable liquids (e.g. gas oil, benzene).

Such contamination bears not only the risk of an increased fire danger, but may as well be disadvantageous for the intended application in other respect.

Temperature Range:

+25°C ... +100°C

Main Units

Manual Army Flash-Point Tester (Field Test)

similar to Pensky-Martens type

Features:

- closed cup method acc. to ISO 2719, EN 22 719 and ASTM D 93 (A Method)
- flash-point readout is in °C
- approved by German Navy for field use
- easy to use by non-trained personnel

Consisting of:

a heater block with handle, heating plate and carrying case

Supplied with:

- 1 cup with handle
- 1 cover with stirrer and igniter mechanism
- 1 thermometer

Note:

This instrument is designed to determine flash-points below +65 °C (+149 °F). Extendable up to +100 °C (+212 °F) if heated in an external oven or hot water bath.

- 12-1000 Power supply: 230 V, 50 Hz
12-1001 Power supply: 115 V, 60 Hz



Options & Accessories

- 12-1002 **Cartridge** with liquid gas
Note: We highly recommend to buy the cartridge locally, since they require special shipment as hazard goods.
- 12-1003 **Liquid Flash Clean** for cleaning after each test
Note: We highly recommend to buy the flash clean locally, since they require special shipment as hazard goods.
- 12-1004 **Lighter**
Note: We highly recommend to buy the cartridge locally, since they require special shipment as hazard goods.

Technical Data

Temperature Range:
+25 to +65 °C (+100 °C)

Measuring Time:
about 15 min.

Accuracy:
>100 °C (+/- 2 °C)
<100 °C (+/- 6 °C)

Dimensions:
Ø : 25 mm
Height : 200 mm
Weight : 2.5 kg

Power Supply:
230 or 115 V, 50/60 Hz

Spare Parts

- 12-1005 **Thermometer**

12-1006
12-1007

Heating Plate, electric and adjustable

Power Supply: 230 V, 50 Hz
Power Supply: 115 V, 60 Hz

User Groups:

Benzene, Fuel, Gas Oil



Scope of Application

This flash-point and fire-point test method measures the tendency of a test specimen to form a flammable mixture with air.

Suitable for viscous materials having a flash-point between +79°C (175°F) and +400°C (752°F) except fuel oils.

Used to define the hazards of flammable and combustible materials used in shipping and safety regulations.

Summary of Method

The temperature of the approximately 70 ml test specimen is increased rapidly at first and then at a slower constant rate as the flash-point is approached. At specified intervals a test flame is passed across the cup until the sample inflames.

The **FLASH-POINT** is the lowest temperature at which the application of an ignition source causes the specimen vapors to ignite.

To determine the **FIRE-POINT**, the test is continued until the application of the ignition source causes the test specimen to ignite and **sustain burning** for a minimum of 5 s.

Temperature Range:

approx. +79°C ... +400°C



Set-up with Skimmer

Flash- & Fire-Point Testing with Open Cup acc. Cleveland

- CLA 4 (automatic)

Cleveland Method:

Petroleum Products (except fuel oil)

ASTM D 92 - JIS K2265

AASHTO T48 - FTM 791-1103

IP 36 (BS 4689)

ISO 2592 (EN 22 592, DIN 51 376, NFT60-118)

Binder, Petroleum Products:

Superpave® (AASHTO T48, ASTM D 92)



The **CLA 4** is an automatic flash- and fire-point tester used to examine liquid as well as highly viscous samples in the same instrument without any additional equipment.

When switched on, the instrument automatically conducts a self test.

When examining **highly viscous specimens**, a preheating time and temperature are set in order to warm-up and liquefy the sample to inserted temperature probe without problem.

Further a **skimmer** is available to remove the surface skin from bituminous samples.

The following programs are available:

- 2 ASTM programs** (for low and high viscous samples)
- 2 ISO programs** (for low and high viscous samples)
- 1 Bitumen program**
- 2 Search programmes** (for low and high viscous samples)
- 3 User programs**

For substances with unknown flash-points, the **CLA 4** has a special **search mode program**. During the entire heating period, the test flame is moved across the sample at suitable intervals. The expected flash-point of a specimen can thereby be found in a time saving and economical manner.

In case of no ignition an excessive **heat protection** circuit shuts off the test at a specified temperature above the pre-selected flash-point.

Further, it is possible to attempt ignition manually at any time.

Selectable display of values in either degrees **Celsius** or **Fahrenheit**.

A **built-in pressure sensor** measures the barometric pressure at the place where the flash tests are performed. Due to the Automatic Barometric Pressure Correction the corrected flash-point value will be displayed.

To record measured values and test parameters for each consecutively numbered sample (numbering sequence set by the user on the key panel), the **CLA 4** is equipped with two RS232 interfaces.

User Groups:

Bitumen, Engine Oil, Hydraulic Fluid, Insulating Oil, Jet Lube, Lube Oil, Power Plant, Regulatory Authorities, Turbine Oil



Main Units

CLA 4 - Automatic Flash- & Fire-Point Tester, Cleveland Method

Petroleum Products: ASTM D 92 - JIS K2265 - AASHTO T48 - FTM 791-1103
IP 36 (BS 4689) - ISO 2592 (EN 22 592, DIN 51 376, NF T60-118)

Binder, Petroleum Products: Superpave®

Features:

- automatic barometric pressure correction
- user definable test programs
- rapid heating mode
- PC-software

Consisting of:

stainless steel housing with two-color powder coating, touch-key panel with large LC-display (visible in up to 10 m distance), two RS232-interfaces for data printer and computer connection, different test-programs, data-transfer and firmware upgrading through bi-directional interface, automatic barometric pressure correction, electric heater, automatic overheat protection, gas igniter with auto-relighting and safety shut-off, re-cooling fan

Supplied with:

- 1 cup "CL"
- 1 temperature probe Pt-100 (glass)
- 1 gas igniter with thermocouple
- 1 electric igniter
- 1 flame detection unit
- 1 flame arrest cover
- 1 PC-software

Temperature Range: **+79 to +400 °C** (+175 to +752 °F)

- 12-0940 Power supply: 230 V, 50/60 Hz, EU-plug
12-0941 Power supply: 110/115 V, 50/60 Hz, US-plug

Options & Accessories

- 12-0956 **Calibration Set "CLA"**
Consisting of:
1 base plate, 1 support rod, 1 boss head, 1 clamp and 1 thermometer ASTM 11C / IP 28C (officially certified)
- 12-0958 **Draft Deflector "CLA"**
- 50-9111 **Reference Liquid "ASTM D 92"** (approx. +250 °C), 250 ml
- 12-1763 **Storage Box** for spare parts and tools
- 11-0599 **USB/RS232-Converter** (verified for petrotest@-units)
with 2 m cable connecting 1 serial port with the USB-port of a PC or Hub

Serial Impact Printer for single sheet & continuous paper with USB-interface to record data like test results, duration of test, etc. (instead of a PC)

Supplied with: 1 data transmission cable, 1 ink ribbon (black)

Technical Data:

Line spacing : 80 characters per line (10 cpi)
Page size (W x H) : 257x364 mm (sheet), 254x558.8 mm (roll)
Ports : serial, USB (1.1) & parallel
Dimensions : 37 x 28 x 16 cm (WxDxH), weight 5 kg

- 12-0282 Power supply : 220/240 V, 50/60 Hz
12-0283 Power supply : 100/130 V, 50/60 Hz

- 12-0954 **Skimmer** for skin removal
- 12-0962 **Cup "CL-DRAIN"** with handle and drainage, approx. 70 ml, made of brass
- 12-0970 **Cup "CL-NIRO"** with handle, approx. 70 ml (with filling mark), standard size, stainless steel
Note! Flash-point results of stainless steel test inserts may deviate from standard results.
- 12-0949 **Temperature Probe Pt-100 (Metal)** for sample temperature

Spare Parts

- 12-0950 **Standard Cup "CL"** with handle, approx. 70 ml (with filling mark), brass
- 12-0951 **Temperature Probe Pt-100 (Glass)** for sample temperature measuring
- 12-0952 **Gas Igniter** with thermocouple for flame monitoring
- 12-0778 **Electric Igniter** with connector cable and plugs
- 12-0953 **Flame Detection Unit** for flash- & fire-point detection
- 12-0960 **Indicator-Ring**
- 12-0955 **Flame Arrest Cover "CLA"** for extinguishing the fire in the cup

Technical Data

Temperature Range:
approx. +79 to +400 °C

Programs: (acc. to international standards)
2x ASTM-Standards
2x ISO-Standards
1x Bitumen
2x Search Run
3x User Defined

Ignition: Gas flame (electrical ignited and automatically controlled)

Stirring Speed: --

Sensing System:
Ionization Method

Barometric Pressure Sensor:
automatic correction of the measured values

Safety:
overheat protection
automatic shut-off

Hardware Clock: included

Interface:
RS232 (for printer)
RS232 (for computer download)
(USB-converter available)

Gas Connection:
for propane/butane or natural gas (max. 50 mbar)

Display: °C / °F (selectable)
high x wide: 56 x 90 mm
digit size : 25 mm

Dimensions:
Width 230 mm
Depth 470 mm
Height 460 mm
Weight 12 kg

Power Consumption:
approx. 600 Watts

Power Supply:
230 or 115 V, 50/60 Hz



12-0958



12-0962



12-0950



Scope of Application

This flash-point and fire-point test method measures the tendency of a test specimen to form a flammable mixture with air.

Suitable for viscous materials having a flash-point between +79°C (175°F) and +400°C (752°F) except fuel oils.

Used to define the hazards of flammable and combustible materials used in shipping and safety regulations.

Summary of Method

The temperature of the approximately 70 ml test specimen is increased rapidly at first and then at a slower constant rate as the flash-point is approached. At specified intervals a test flame is passed across the cup until the sample inflames.

The **FLASH-POINT** is the lowest temperature at which the application of an ignition source causes the specimen vapors to ignite.

To determine the **FIRE-POINT**, the test is continued until the application of the ignition source causes the test specimen to ignite and **sustain burning** for a minimum of 5 s.



12-2735



12-0629



12-0950

Flash- & Fire-Point Testing with Open Cup acc. Cleveland

- CL 5 (semi-automatic)

Cleveland Method for:

Petroleum Products (except fuel oil)

ASTM D 92 - JIS K2265

AASHTO T48 - FTM 791-1103

IP 36 (BS 4689)

ISO 2592 (EN 22 592, DIN 51 376, NF T60-118)

Binder, Petroleum Products:

Superpave® (AASHTO T48, ASTM D 92)

Temperature Range:

+79°C ... +400°C



12-2730 & 12-2735

Main Units

CL 5 - Semi-Automatic Flash- & Fire-Point Tester, Cleveland Method

ASTM D 92 - JIS K2265 - AASHTO T48 - FTM 791-1103 - Superpave®

IP 36 (BS 4689)

ISO 2592 (EN 22 592, DIN 51 376, NF T60-118)

Consisting of:

high-grade stainless steel housing with two-color powder coated, motor-driven arm with gas ignition device & control valve, electric heating, infinitely variable electronic heater control, automatic overheat protection, re-cooling fan, thermometer holder

Supplied with:

1 cup with handle

1 thermometer ASTM 11C/IP 28C (precision made)

Technical Data:

Temperature range : approx. +79 to +400 °C (+175 to +752 °F)

Ignition : gas

Dimensions : 23 x 47 x 46 cm (W x D x H)

Weight : 9 kg

12-2730 Power supply : 230 V, 50/60 Hz

12-2731 Power supply : 115 V, 50/60 Hz

Options & Accessories

12-2735 **Draft Deflector "CL"** (recommended for gas ignition tests)

12-2737 **Flame Arrest Cover "CL"**

12-0629 **Pre-Regulating Valve** for gas supply with hose adapter, suitable for all types of burning gases

12-0970 **Cup "CL-NIRO"** with handle, approx. 70 ml (with filling mark), standard size, stainless steel

Note! Flash-point results of stainless steel test inserts may deviate from standard results.

12-0962 **Cup "CL-DRAIN"** with handle and drainage, approx. 70 ml, made of brass

12-1763 **Storage Box** for spare parts and tools

50-9111 **Reference Liquid "ASTM D 92"** (approx. +250 °C), 250 ml

Thermometer

Precision Made	Officially Certified	Type		Range
		ASTM	IP	
12-0751	12-0752	11C	28C	-6 to + 400 : 2°C
12-0753	12-0754	11F	28F	+20 to + 760 : 5°F

User Groups:

Bitumen, Engine Oil, Hydraulic Fluid, Insulating Oil, Jet Lube, Lube Oil, Power Plant, Regulatory Authorities, Turbine Oil

Spare Parts

12-0950 **Standard Cup "CL"** with handle, approx. 70 ml (with filling mark), brass

12-2734 **Ignition Device** with control valve



Flash- & Fire-Point Testing with Open Cup acc. Cleveland (manual)

Cleveland Method for:

Petroleum Products (except fuel oil)

ASTM D 92 - JIS K2265

AASHTO T48 - FTM 791-1103

IP 36 (BS 4689)

ISO 2592 (EN 22 592, DIN 51 376, NF T60-118)

Binder, Petroleum Products:

Superpave® (AASHTO T48, ASTM D 92)

Temperature Range:

+79°C ... +400°C



Scope of Application

This flash-point and fire-point test method measures the tendency of a test specimen to form a flammable mixture with air.

Suitable for viscous materials having a flash-point between +79°C (175°F) and +400°C (752°F) except fuel oils.

Used to define the hazards of flammable and combustible materials used in shipping and safety regulations.

Summary of Method

The temperature of the approximately 70 ml test specimen is increased rapidly at first and then at a slower constant rate as the flash-point is approached. At specified intervals a test flame is passed across the cup until the sample inflames.

The **FLASH-POINT** is the lowest temperature at which the application of an ignition source causes the specimen vapors to ignite.

To determine the **FIRE-POINT**, the test is continued until the application of the ignition source causes the test specimen to ignite and **sustain burning** for a minimum of 5 s.

Main Unit

12-0701 Manual Flash- & Fire-Point Tester, Cleveland Method

ASTM D 92 - JIS K2265 - AASHTO T48 - FTM 791-1103 - Superpave®

IP 36 (BS 4689)

ISO 2592 (EN 22 592, DIN 51 376, NF T60-118)

Consisting of:

special tripod stand, heating collar, insulating board, gas ignition device with control valve, hose connection, universal gas burner, thermometer holder

Supplied with:

1 cup with handle

1 thermometer ASTM 11C/IP 28C

Technical Data:

Temperature range : approx. +79 to +400 °C (+175 to +752 °F)

Ignition : gas

Dimensions : 27 x 18 x 37 cm (W x D x H)

Weight : 5.5 kg



12-0710

Options & Accessories

12-0710 Draft Deflector "Universal" (recommended for gas ignition tests)

12-0629 Pre-Regulating Valve for gas supply with hose adapter, suitable for all types of burning gases

50-9111 Reference Liquid "ASTM D 92" (+250 °C), 250 ml



12-0950

Thermometer

Precision Made	Officially Certified	Type		Range
		ASTM	IP	
12-0751	12-0752	11C	28C	-6 to + 400 : 2°C
12-0753	12-0754	11F	28F	+20 to + 760 : 5°F



12-0629

Spare Parts

12-0950 Standard Cup "CL" with handle, approx. 70 ml (with filling mark), brass

11-0110 Universal Gas Burner for butane, propane, town & natural gas

12-0755 Heating Collar, made of brass

12-0756 Insulating Board with center hole, made of ceramics

User Groups:

Bitumen, Engine Oil, Hydraulic Fluid, Insulating Oil, Jet Lube, Lube Oil, Power Plant, Regulatory Authorities, Turbine Oil



Scope of Application

Used to define and classify "flammable" & "combustible" substances.

Closed Cup Model:

For **flash-point temperature** determination of a sample in an closed small-scale cup, or detecting whether a product will or will not flash at a specified temperature (flash / no flash).

Open Cup Model:

Methods for **sustained burning** of liquid mixtures using the small scale open-cup apparatus.

Certain substances classified as flammable by closed cup flash-point testing may be reclassified as non-flammable by open cup combustibility testing.

This has significant potential cost implications for the packaging storage and shipping of many materials.

Suitable for paints, adhesives, solvents, petroleum & related products.

Further for Biodiesel / FAME (fatty acid methyl esters) up to +100 °C.

Summary of Method

The testing will not start until the sample and the air/vapor-mix above it are in a state of equilibrium.

Which allows to get results fast and with a small amount of sample.

For the **FLASH / NO FLASH** determination ignition source is applied to a tempered sample to observe whether or not a flash occurs. Used to detect the ability to yield flammable vapors.

The **FLASH-POINT** is the lowest temperature at which the application of an ignition source causes the specimen vapors to ignite.

To determine the **FIRE-POINT**, the test is continued until the application of the ignition source causes the test specimen to ignite and **sustain burning** for a minimum of 5 s.

Flash-Point Testing with Closed / Open Cup - Rapid Tester

"Serie 3" (automatic)

Small Scale Closed Cup:

Rapid Equilibrium Method (Flashpoint):

IP 523 (IP 303-1) - ASTM D 3828-B - ISO 3679 (BS 6664-4, EN 456, NfT60-616) - JIS K2265

ASTM D 3278-B - UN Class 3 N - ASTM E 502

ASTM D 7236

Rapid Equilibrium Method (Flash/no Flash):

IP 524 (IP 303-2) - ASTM D 3828-A - ISO 3680 (BS 6664-3, DIN 55 680, NfT60-617)

ASTM D 3278-A

Small Scale Open Cup:

Sustained Burning Method (Fire-Point):

ASTM D 4206 - ISO 9038 (NfT30-068) - BS 3900-A11



Temperature Range:

ambient ... +300°C

or

+10 ... +110°C

Rapid Tester "Serie 3"

A range of unparalleled features ensures ease of operation and requires a minimum of operator skill.

Test parameters are set via the keypad and a digital display provides temperature, sample size, test time, and flash detection status. Default „auto“ values are available for standard test conditions.

An extended operating temperature range allows tests from 0 to +300 °C.

Flash-point is automatically detected using a thermally activated detector, reducing the risk of operator error and minimizing the potential danger of inhaling fumes during a test.

A rechargeable gas tank with on/off switch and fine adjustment are integral to the unit.



Main Units

12-1240 Rapid Flash-Point Tester "Series 3" (closed cup)

Flashpoint Method:

IP 523 (IP 303-1) - ASTM D 3828-B - ISO 3679 (BS 6664-4, EN 456, NF T60-616) - JIS K2265
ASTM D 3278-B - UN Class 3 N - ASTM E 502

Flash/no Flash Method:

IP 524 (IP 303-2) - ASTM D 3828-A - ISO 3680 (BS 6664-3, DIN 55 680, NF T60-617)
ASTM D 3278-A

Features:

- simple calibration
- automatic flash-point detection
- determination of flash-point in less than 2 minutes
- small sample size (2 or 4 ml)

Consisting of:

housing with touch-key panel and LC-display, integrated **aluminum cup, cover with shutter assembly**, built-in gas igniter at the cover, timer, digital temperature pre-selection in °Celsius/ Fahrenheit, automatic flash-point detection

Supplied with:

- 1 syringe 2 ml
 - 1 rechargeable gas tank with igniter
- Power supply: 115/220 V, 50/60 Hz (switchable)

12-1241 Rapid Flash-Point Tester "Series 3" (open cup)

Fire-Point Method:

ASTM D 4206 - ISO 9038 (NF T30-068) - BS 3900-A11
UN Class 3 L.3 - CFR 49-173.120

Consisting of:

like Standard Unit (12-1240), but with an **open cup** for flash / no flash, finite determinations or sustained combustion tests.

A manually operated flame-sweeping arm is fitted to the cup and gas is supplied from the integral tank via the control valve. The flash or sustained combustion characteristics of the sample are observed visually by passing the test flame over the sample.

Power supply: 115/220 V, 50/60 Hz (switchable)

12-1260 Rapid Flash-Point Tester "Series 3" (non-corrosive cup & active cool)

Flashpoint Method: see 12-1240

Flash/no Flash Method: see 12-1240

Ramp Method: ASTM D 7236

Features:

- Peltier cooling
- Rapid cool down

Consisting of:

like Standard Unit (12-1240), but fitted with **special stainless steel cup** suitable for testing corrosive samples and electronic **Peltier cooling** with rapid cool down.

Temperature Range: **+10 to +110 °C**

Power supply: 115/220 V, 50/60 Hz (switchable)

Cooling

12-0076 Coolant Module (for 12-1240)

for pre-cooling the cooling block when measuring sub-ambient (charged with dry ice)

12-0086 Cooling Block, aluminum, to cool-down the sample cup after testing without cooling-water

Options & Accessories

12-1243 Adapter for power supply, allows instrument to be operated from 12 V supply

12-1244 Carry Case

Consisting of:

foam cut outs to house instrument, gas tank, power supply and syringe

Dimensions (H x W x D): 21 x 40 x 30 cm

12-1248 Sample Removal Kit

with pump and trap to extract and collect used sample from cup after test.

12-1252 Reference Liquid (Kerosene) certified, 50 ml, nominal value +66 °C

Spare Parts

12-1245 Thermometer (0 to +110 °C)

with calibration certificate

12-1247 Thermometer (+100 to +300 °C)

with calibration certificate

12-0081 Syringe, 2 ml

12-1246 Syringe, 4 ml, for high temperature tests above +100 °C

12-1250 Gas Tank (portable and refillable)

Consisting of: built-in on/off switch, igniter and stand, 1 m gas tubing

Note: To be filled by using any standard gas lighter refill cartridge. We highly recommend to buy the LPG-Refill Container locally, because it would require special shipment as hazardous goods.

Technical Data

Temperature Range:

12-1240 / 1:
ambient to +300 °C (572 °F)
(sub ambient using optional accessory 12-0076)

12-1260: +10 to +110 °C

Cooling:

12-1240 / 1: optional

12-1260: Peltier

Cup:

12-1240 / 1: aluminum

12-1260: stainless steel

Ignition: gas

Sample Size:

2 ml (flash-points up to +100 °C)
4 ml (flash-points above +100 °C)

Test Time: 1 to 99 min.

Dimensions:

Width	28 cm
Depth	25 cm
Height	25 cm
Weight	4 kg



Rear View



12-1250

User Groups:

Aerosols, Airports & Aviation, Asphalt, Automotive, Batteries, Beverages, Chemicals, Coating, Cosmetics, Diesel, Dyes, Electrical Cables, Engineering, Engine Oil, Fats, Fuel, Gasoline, Jet Fuel, Jet Lube, Lube Oil, Marine, Motor Vehicles, Paint, Petroleum, Pharmaceuticals, Plastics, Polishes, Polymers, Power Generation, Regulatory Authorities, Road Research, Rubber, Solvent, Turbine Oil, Varnish, Wax





Auto-Ignition Test Units





Scope:

For the determination of liquids and gases, in particular of mineral hydrocarbons and their mixtures, having an auto-ignition temperature between +75 °C and +650 °C.

Auto-Ignition Temperature - ZPA 3 (automatic)

Depending on the components suitable for:

Liquid Tests:

**DIN 51 794 - CEI 79-4 - NF T20-037
EN 14 522**

Solid Tests:

NF T20-036 - 79/831/EWG

Temperature Range:
ambient ... +650°C



Technical Data

Temperature Range:
ambient to +650 °C
(+1202 °F)

Programs:

- Pre-Test Program
- Main Program A1
- Main Program A2
- Solid Program (acc. 79/831/EWG)
- Calibration Program
- Glow Program

Ignition:

auto-ignition

Interface:

RS232 (for printer)
RS232 (for downloads on PC)

Dimensions (WxDxH):

Control Unit : 37x37x40 cm
Printer : 42x30x20 cm
Furnace : 30x30x62 cm
Feeder : 28x32x52 cm

Power Consumption:

approx. 1200 Watts

Power Supply:

230 or 115 V, 50/60 Hz

Inflammable liquids, like solvents, fuels or lubricants tend to auto-ignite if getting in contact with a hot surface.

The auto-ignition temperature determination could happen to take 1 to 2 days and requires the continuous attention of experienced laboratory personnel.

Since not only the lowest temperature at which auto-ignition of the sample occurs must be found stepwise but also the optimal sample volume for this type of flash (flame).

During the tests the **ZPA 3** is **working** for many hours totally **independent**. Only for the final test the flasks have to be replaced by fresh ones.

The automatic process is **reducing the total test-time** by the periods before the sample injection. Due to this and the less attention payed by the user make this test more cost-effective.

The **automatic ZPA 3** has a heated sample-feeding device equipped with a photocell controlled drop counter for **liquid material** and a peristaltic pump (VITON®-sampling hose).

Temperature control, air purging of the flask and the flame detection, however, will be automatic.

But even without the automatic sample-feeder the instrument can be used as **semi-automatic ZPA 3**. In this case the sample will be injected with a syringe after an acoustic signal. The quantity will be recommended on the instrument's display, as soon as the next temperature step is set. Temperature control, air purging of the flask and the flame detection, however, will be automatic.

The application of the **ZPA 3** Auto-ignition Tester is not limited to liquid substances.

A special program allows to examine **pasty or solid matter** on its inflammability. A special mounting device for specimen cubes is available.

Automatic Programs:

Pre-Test Program:

starts at ambient temperature with a temperature rise of 3 to 5 K/min and detects approachingly the ignitionpoint in 20 K steps. When a self-ignition is detected the program will switch to the Main-Program A1 automatically.

Main-Program A1:

detects out of a row of various drop-amounts the lowest selfignition in 5 K steps. Than the program will go ahead to Main-Program A2.

Main-Program A2:

standardized ignition temperature detection in steps of 2 K with different amounts of drops, standardized determination with the lowest value of the 1st line of tests,

re-start after cleaning of ignition chamber and re-test to finalize the lowest value.

Solid-Program:

to examine the inflammability of solid or pasty materials acc. European Community Act 79/831/CEE.

Calibration-Program:

for the automatic thermocouple calibration

Glow-Program:

to clean the Erlenmeyerflasks (Pyrolyse)



Sample Feeder



Main Units

ZPA 3 - Automatic Auto-Ignition Tester with Heated Sample-Feeder

Liquids : EN 14 522 - DIN 51 794 - CEI 79-4 - NF T20-037

with further accessories for:

Solids : NF T20-036 - 79/831/EWG

Features:

- auto-ignition test is working automatically for hours
- 6 programs for measuring and calibration
- auto-ignition temperature and parameter on LC-display
- detailed documentation with printer

Consisting of:

Furnace with safety cage: adjustable up to +650°C,
with holder for temperature probe and indicator

Metal Insert: stainless steel with an additional fixture for temperature probe

Test Insert: complete with two-part (non-asbestos) insulation ring, ignition flask (200 ml) and thermocouple

Calibration Block: for automatic thermocouple testing, adjustment and calibration

Control Unit: with a 3-step program for pre-tests, main tests and automatic calibration of thermocouples. Connections for compressed air (valve controlled air purge) and recorder to register temperature curves. Permanent display of furnace and sample temperatures as well as information about test run, heating and program sequence.

Automatic Sample Feeding Device: with drop counting controlled by photocells, equipped with a peristaltic pump (VITON®-sampling hose). Further equipped with a heating device (required by samples of solid consistence at ambient temperatures) to heat up the sample by an air chamber. Due to special designed pump and tubing, the temperature will remain unchanged all the way up into the drip-tip of the feeder arm. Adjustable temperature range between ambient and +95 °C.

Printer: documentation of each completed ignition attempt with sample no., program segment, pre-selected temperature, sample volume, ignition delay, flash intensity, code and program time lapse.

Note: It is possible to connect instead of the serial printer, a single-line recorder (not included) to draw sample temperature curves.

Supplied with:

- 1 ignition flask
- 1 cover for test insert
- 3 insulation ring for cover
- 1 ignition point indicator
- 1 temperature probe Pt-100
- 1 thermocouple for test flask

Note: A solid heating program is included but the required accessories are on separate order.

12-1822	Power supply	: 230 V, 50/60 Hz, 1200 W
12-1823	Power supply	: 115 V, 50/60 Hz

ZPA 3 - Semi-Automatic Auto-Ignition Tester without Sample-Feeder

Depending on the components only suitable for:

Liquids : EN 14 522 - DIN 51 794 - CEI 79-4 - NF T20-037

Like 12-1822 but: with sample syringe instead of Automatic Sample Feeding Device

12-1800	Power supply	: 230 V, 50/60 Hz, 1200 W
12-1801	Power supply	: 115 V, 50/60 Hz



12-0838



12-0863

Option for Solids

12-0838	Solid Conversion Set 79/831/EWG <u>Consisting of:</u> 1 thermocouple (NiCr-Ni) 10 baskets
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12-0870

Spare Parts

12-0819	Syringe , 1 ml, for sample introduction <u>without</u> automatic sample feeding device	12-0870	Baskets for testing solids (cube), made of metal, pack of 10
12-0816	Ignition Flask , 200 ml, made of glass (Erlenmeyer flask)	12-0871	Thermocouple for test flask (NiCr-Ni) with protective tubes to measure flask temperature
12-0850	Furnace with safety case	12-0872	Thermocouple for solids (NiCr-Ni)
12-0854	Metal Insert for furnace, made of stainless steel	12-0882	Sampling Hoses (VITON®) , type D, pack of 10
12-0855	Air Purging Device	12-0883	Sampling Hoses (EPDM/PP) , acetone resistant, pack of 10
12-0858	Cover for test insert	12-0829	Hose Connection for gas conversion set, 1 m
12-0859	Insulation Ring for cover	12-0832	Hand Pump for gas conversion set, 200 ml, made of glass
12-0863	Ignition Point Indicator		
12-0864	Temperature Probe Pt-100 to measure the furnace temperature		

User Groups:
Fuel, Grease, Jet Fuel, Solid,
Solvent



Scope:

For the determination of hot- & cool-flame auto-ignition temperatures of a liquid chemical in air at atmospheric pressure in a uniformly heated vessel.

Auto-Ignition Temperature of Liquids (semi-automatic)

ASTM E 659

Temperature Range:
+200°C ... +1200°C



Main Units

Semi-Automatic Auto-Ignition Tester

ASTM E 659

Consisting of:

insulated furnace and cylindrical heating chamber, with adjustable mirror for safe chamber observation during operation

Furnace temperature is digitally displayed and controlled in the range of: +200 to +1200 : 1°C

Thermocouple outputs can be digitally displayed or forwarded to the optional strip chart recorder.

Supplied with:

- 4 thermocouples
- 1 flask (500 ml) made of borosilicate
- 1 thermocouple tube made of borosilicate
- 1 syringe, 1 ml

Technical Data:

Temperature range : +200 to +1200°C (+392 to +2192 °F)

Ignition : auto-ignition

Dimensions (WxDxH)

- Control Unit : 56 x 25 x 36 cm
- Furnace : 38 x 38 x 56 cm

Weight : 33 kg

12-1802 Power supply: 220/240 V, 50/60 Hz

Strip Chart Recorder, 1 port

for recording the thermocouple output during tests

Consisting of:

calibrated width 250 mm, measuring input Type „K“, chart speeds, linearized

12-1803 Power supply: 115/230 V, 50/60 Hz (switchable)

Hot Air Gun to exhaust the flask during tests

12-1804 Power supply: 220/240 V, 50/60 Hz

Spare Parts

12-1805 Flasks, made of borosilicate glass, 500 ml, pack of 10

12-1808 Syringe for sample introduction with bent needle, 1 ml

12-1810 Thermocouple “T” for the sample chamber

12-1811 Thermocouple Set for temperature regulation and control, “T1”, “T2”, “T3”, pack of 3

User Groups:
Fuel, Gasoline



Auto-Ignition Temperature of Solids acc. Grewer (semi-automatic)

VDI 2263 (in analogy to 79/831/EWG)

Main Units

Semi-Automatic Auto-Ignition Tester, Grewer Method

VDI 2263 (in analogy to 79/831/EWG)

Features:

- max. 5 simultaneous tests and 1 blindtest
- 2 parameter (setpoint and heating rate 2°C/min)
- overheat protection

Consisting of:

two-partite aluminum-block controlled by Pt-100 temperature probe with 6 test wells to receive sample baskets. Heater 1.000 W with programmable controller including ramps up to 2 °C / min up to max. +400 °C. Holder for thermocouple (Ni-CrNi) with holder for wire-baskets. Tube inlet for compressed air to test in air-stream (air flow to be controlled manually). Test wells are having opening at the bottom to allow air circulation.

Supplied with:

- 10 baskets
- 3 thermocouples

Note:

Alternatively a screen registration unit (25-0325) may be connected.
The recorder is not included in delivery.

Technical Data:

Temperature range	: ambient to +400 °C (+752 °F)
Ignition	: auto-ignition
Dimensions (W x D x H)	: 156 x 156 x 525 mm
Weight	: approx. 11 kg

12-1840 Power supply: 230 V, 50/60 Hz

Screen Registration Unit with (offline) PC Software

6 analog ports for either thermocouples for simultaneous recording and depict on the built-in 5"-STN-flatscreen, 3 relay-ports are programmable by the user. Files can be stored with 3.5"-diskdrive (1.44 MB) and shown on PC with the program, resistance-thermometers, 4 binary-ports, interface RS232/RS485.

Technical Data:

Data sets	: for ca. 650.000 data sets.
Flash-Memory	: for ca. 350.000 data sets.
Internal Reading-Rate	: 250 ms,
min. Memory-Cycle	: 1 sec.

25-0325 Power supply: 115/230 V, 50/60 Hz

Scope:

Auto-ignition is the process which causes the ignition of a dust layer, after self-heating of dust that is surrounded by a heat source and air, is called auto-ignition.

The oxidizing self-heating depends upon the sample size and the duration of the temperature exposure. Increased sample volume will result in auto-ignition at lower surrounding temperatures.

Temperature Range:
ambient ... +400°C



12-1840



12-0870

Spare Parts

12-0870 Baskets for testing solids (cube), made of metal, pack of 10

12-0872 Thermocouple for solids (NiCr-Ni)

User Groups:

Chemicals, Food, Paint, Paint Binders, Pharmaceuticals, Plastics, Polishes



Reference Liquids

All values stated in the following tables are to be considered as nominal values only.

The actual and exact data may deviate in a certain degree and will be either shown on the label of the container or on the pertinent test certificate.

Flash-Point Reference Liquid



50-9013

Part-No	DIN-Type	Material	Flash-Point	Size
50-9000 *	AP 5	Ethanol	+ 5 °C	1000 ml
50-9006 *	AP 10	i-Propanol	+ 10 °C	
50-9001 *	AP 21	i-Propanol / Water	+ 21 °C	
50-9007 *	AP 23	i-Propanol / Water	+ 23 °C	
50-9002 *	AP 35	Hydrocarbon Mixture	+ 35 °C	
50-9004 *	AP 55	Cis / trans Decalin	+ 55 °C	
50-9005 *	AP 61	Hydrocarbon Mixture	+ 62 °C	
50-9022 *	PM 61	Hydrocarbon Mixture	+ 62 °C	
50-9010	PM 75	Hydrocarbon Mixture	+ 73 °C	
50-9013	PM 100	Hydrocarbon Mixture	+ 103 °C	
50-9014	PM 125	Hydrocarbon Mixture	+ 124 °C	
50-9020	PM 150	Diethylenglycol	+ 147 °C	
50-9016	PM 175	Hydrocarbon Mixture	+ 175 °C	
50-9017	PM 190	Hydrocarbon Mixture	+ 189 °C	

Part-No	Standard	Test Name	Material	Flash-Point approx.	Size
50-9109 *	IP 170	Abel	Jet Fuel	+40.9 °C	250 ml
50-9110 *	ASTM D 93	Pensky-Martens	Gas Oil	+ 65 °C	255 ml
50-9111	ASTM D 92	Cleveland	Lubricant	+ 265 °C	250 ml
50-9112	ASTM D 93	Pensky-Martens	Lubricant	+ 198 °C	250 ml
50-9113 *	ASTM D 93	Pensky-Martens	Diesel	+ 74 °C	250 ml
50-9114 *	ASTM D 56	TAG		+ 47 °C	255 ml

Kerosin Reference Liquid



50-9113

Part-No	Test Name	Range	Test Amount	Size
50-9023 *	Flash-Point	approx. 35.0 to 60.0°C	85 ml	500 ml

Gasoil Reference Liquid

Part-No	Test Name	Range	Test Amount	Size
50-9024 *	Flash-Point	approx. 56.0 to 80.0°C	75 ml	500 ml

* **Note:** These liquids require special shipment as hazardous goods, due to their low flash-point



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