



Instruments for Chemical  
and Petroleum Products

# A Tradition of Competence

140 years of technological advances lie between the first flash point tester and today's Anton Paar product line of flammability measuring instruments.

Mr. Berthold Pensky developed the first closed-cup flash point tester and set a milestone for the production of high-quality and high-precision flash point testers. Aligned to the requirements of various industrial branches the instruments from Berlin met a worldwide demand.

The acquisition of Petrotest by Anton Paar resulted in the combination of the spirit of research and inventive talent with the advantages of a worldwide, well-established sales and service team.

Founded in 1922, Anton Paar today employs over 2000 people in 20 countries who manage a global business and provide the whole value chain, starting from product ideas, research and development, production, sales, application support and after-sales services.

As a result of this unique concentration of talents and know-how, Anton Paar's product portfolio has grown continuously. It now covers a wide range of laboratory instruments, process technologies and automation systems, ranging from standardized QC to complex R&D solutions.

Anton Paar is close to you and your work. An experienced local team speaks your language and provides application support and training. Anton Paar thinks globally and acts locally.



# Flash Point Measurement

## All methods – all standards – one product line

Anton Paar has the suitable flammability tester for each type of measuring task in its product line. Tests according to standardized methods in the temperature range of -30 °C to 400 °C are possible to cover a wide range of applications. This includes: the petrochemical field, calibration and regulation authorities, transportation and shipping, engineering, waste management and the cosmetics and food industries.

### Cleveland method ...

... open-cup determination for expecting flash and fire point in the range of 79 °C to 400 °C (175 °F to 752 °F).

### Pensky-Martens methods ...

... closed-cup determination for expecting flash point in the range of 40 °C to 370 °C (104 °F to 698 °F).

#### Comprising:

##### Method A

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

##### Method B

for residual fuel oils, cutback residual, used lubricating oils, non-homogeneous materials like mixtures of petroleum liquids and solids, surface-film-building petroleum liquids.

##### Method C

for biodiesel (FAME).

Requires electronic flash point detection!

### Tag method ...

... closed-cup determination for expecting flash point below 93 °C (200 °F).

### Abel method ...

... closed-cup determination for expecting flash point in the range of -30 °C to 70 °C (-22 °F to 158 °F).

### Pensky-Martens closed-cup (PMCC).

PMA 5 is standardized for both biodiesel and biodiesel blended fuels along with distillate fuel such as diesel, heating oil and kerosene and potentially flammable liquids as lubricating oils.

#### Product highlights are:

- ▶ One-Twist head
- ▶ Multi-detector
- ▶ Integrated fire-extinguishing device
- ▶ Gas and electric ignition
- ▶ 1-button operation
- ▶ Tray

For standardized, comfortable, versatile and safe flash point testing the PMA 5 Pensky-Martens tester is the right choice!

# All Methods – All Standards – One Product Line

## ABA 4 Abel Flash Point Tester

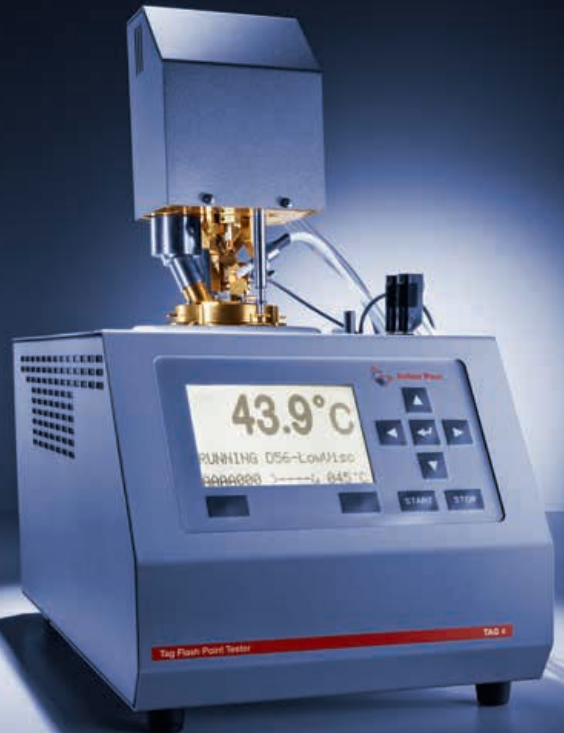
### Standard methods

Abel flash point: ISO 13736, IP 170  
Equilibrium procedure: ISO 1523, IP 492, EN 924,  
ISO 1516, IP 491  
Optional Abel-Pensky: DIN 51755-1

## TAG 4 Tag Flash Point Tester

### Standard methods

Tag flash point: ASTM D56, FTM 791-1101  
Equilibrium procedure: ASTM D3941, ISO 1523,  
IP 492, EN 924, ASTM D3934,  
ISO 1516, IP 491



### Benefits at a Glance

- ▶ Two cooling systems with Peltier elements according to the ISO 13736 standard: an economical air-cooled model and a low-temperature version with external water cooling
- ▶ The two ignition systems in each unit give you the flexibility to work with an electric or gas igniter: if the gas ignition is used, the electric igniter will automatically relight the gas flame during the test, if necessary
- ▶ The patented One-Twist swivel-around multi-function head guarantees the safe and easy one-hand connection of all sensors and actuators such as the shutter-release, stirrer, igniter and detector contacts
- ▶ An extended measuring range up to 110 °C enables you to go beyond the conventional scope of the Abel method

### Benefits at a Glance

- ▶ Two cooling systems with Peltier elements are available: an economical air-cooled model and a low-temperature version with external water cooling
- ▶ The two ignition systems in each unit give you the flexibility to work with an electric or gas igniter: if the gas ignition is used, the electric igniter will automatically relight the gas flame during the test, if necessary
- ▶ The patented One-Twist swivel-around multi-function head guarantees the safe and easy one-hand connection of all sensors and actuators such as the shutter-release, igniter, and detector contacts
- ▶ An extended measuring range up to 110 °C enables you to go beyond the conventional scope of the method

## PMA 5

### Pensky-Martens Flash Point Tester

#### Standard methods

Pensky-Martens methods for petroleum products:  
ASTM D93 A+B+C, ISO 2719 A+B, JIS K 2265-3 A+B,  
IP 34 A+B, GOST R EN ISO 2719



#### Benefits at a Glance

- ▶ Integrated fire-extinguishing system automatically controlled or manually released (requires N<sub>2</sub> or CO<sub>2</sub> gas)
- ▶ The patented One-Twist swivel-around multi-function head guarantees the safe and easy one-hand connection of all sensors and actuators such as the shutter release, stirrer, igniter and detector contacts
- ▶ A multi-detector combines the flash point detector and the temperature probe in a solid housing with a perfectly adjusted immersion depth
- ▶ Memory for 1000 tests, 20 operators, 100 sample names
- ▶ Statistical analysis (Min, Max, Mean, Repeatability)
- ▶ Data handling via USB stick for import into Excel® or to LIMS

## CLA 5

### Cleveland Flash & Fire Point Tester

#### Standard methods

ASTM D92, ISO 2592, JIS K 2265-4, AASHTO T48,  
FTM 791-1103, IP 36, GOST 4333



#### Benefits at a Glance

- ▶ Memory for 1000 tests, 20 operators, 100 sample names, 21 test methods
- ▶ Statistical analysis (Min, Max, Mean, Repeatability)
- ▶ Measures the flash point of silicone samples without any problems
- ▶ Automatically lights up the test flame, relights it by an electric igniter and suppresses the gas source at the end of the test

# Versatility by Options



## PMA 4 SC Sample Changer

The Pensky-Martens closed-cup tester with sample changer measures the flash point of up to 12 samples automatically. PMA 4 SC is suitable for flammability applications on both biodiesel and biodiesel blended fuels along with diesel, heating oil and kerosene. It is also commonly used for other potentially flammable liquids.

## On-site calibration

The calibration set is a mandatory accessory for all flash point tester calibration programs. It is used to calibrate the sample temperature sensor Pt100 dynamically against certified liquid-in-glass thermometers.

The on-site calibration feature is very cost-effective and available at any time.



## Multi-detector functionality check

The holding device for multi-detectors (PMA and ABA/TAG) allows you to check the functionality of your Pt100 and thermo-couple and enables calibration services to calibrate the Pt100.

The diagnosis function of the sensitive sensors prevents unnecessary service costs in case of unexpected measurements.

## Small-scale samples

The test insert millicup for small sample volumes between 2 mL to 15 mL allows the application of the flash point tester for small sample quantities.

A reduced sample volume of 80 % is valuable for the cosmetics industry and also the R&D field.

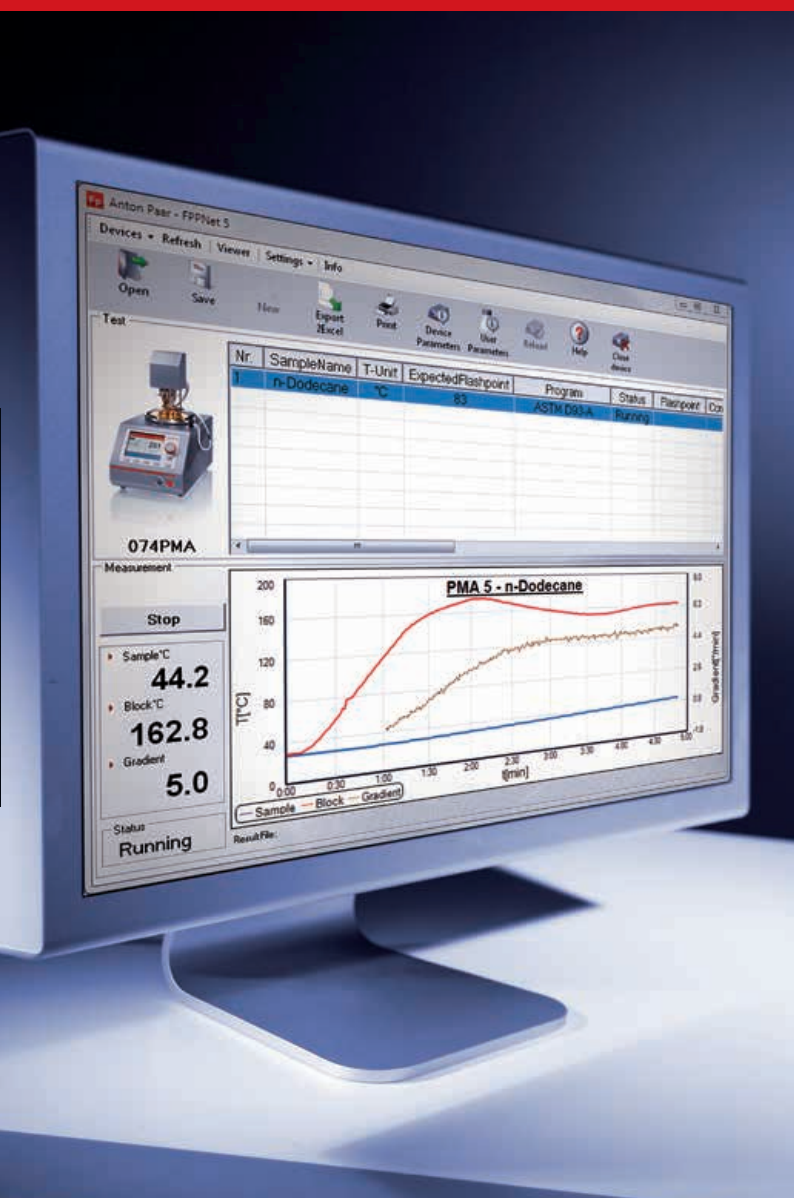


## Versatility by stainless steel

The test insert is a stainless steel alternative to the 75 mL standard type made of brass.

The multi-detector combines the flash point detector with a sturdy stainless steel temperature probe. Although not in compliance with official standards it extends the spectrum of samples.

# High Throughput



## FPPNet – Software for automatic flash point testers

The software serves the purpose of reading and evaluating test data as well as controlling the automatic flash point testers PMA 5, CLA 5, ABA 4, TAG 4, PMA 4 SC (sample changer version) and their previous models (PMA 4, CLA 4).

It is easy to operate, with self explanatory menus. The flash point tester is connected to the PC-RS232 interface by using a null modem cable or the USB port.

### Benefits at a Glance

- ▶ Monitoring of real-time test progress on the PC screen
- ▶ Traceable documentation of all parameter adjustments
- ▶ Graphical display of the sample temperature, heater temperature and heating rate

### Test procedures for the following flash point test methods:

<b>Pensky Martens</b>	ASTM D93-A+B+C, ISO 2719-A+B, JIS K 2265
<b>Cleveland</b>	ASTM D92, ISO 2529, JIS K 2265
<b>Abel</b>	ISO 1516, ISO 1523, ISO 13736
<b>Tag</b>	ASTM D56, ASTM D3934, ASTM D3941
<b>User-defined programs</b>	Can differ from standard test methods

**Operating system:** MS Windows® | XP SP3 | Vista | Windows 7



## Multi-detector ensures full conformity with ASTM standard requirements

As clearly stated in the ASTM standards for closed-cup flash point testing, e.g. ASTM D 93-07, the flash point values are a function of the apparatus design and can therefore not be obtained by different test methods, or with a different test apparatus. Only the Anton Paar closed-cup flash point testers PMA 5, ABA 4, TAG 4 strictly follow these technical specifications without any constructive deviation such as additional openings in the lid for placing a flash point detector.

The solution is the Anton Paar multi-detector which combines the flash point detector and the temperature probe in a solid housing.

# Specifications

Technical specifications	ABA 4		TAG 4	
<b>Test programs</b>	Abel flash point: ISO 13736, IP 170   Equilibrium procedures: ISO 1523, IP 492, EN 924   ISO 1516, IP 491   Optional Abel-Pensky: DIN 51755-1   2 individually designable test programs		Tag flash point: ASTM D56, FTM 791-1101   Equilibrium procedures: ASTM D3941, ISO 1523, IP 492, EN 924   ASTM D3934, ISO 1516, IP 491   2 individually designable test programs	
<b>Operation</b>				
<b>Configuration</b>	ABA 4 (air-cooled)	ABA 4 (liquid-cooled)	TAG 4 (air-cooled)	TAG 4 (liquid-cooled)
<b>Application range</b> (°C/°F selectable)	10 °C to 110 °C	-30 °C to 110 °C	10 °C to 110 °C	-30 °C to 110 °C
<b>Ignition type</b>	Gas and electric (interchangeable)		Gas and electric (interchangeable)	
<b>Stirring speed</b>	According to method or user-defined		–	
<b>Heating rate</b>	According to method or user-defined		According to method or user-defined	
<b>Cooling by Peltier elements</b>	By built-in fan	With tap water or a low-cost circulation cooler	By built-in fan	With tap water or a low-cost circulation cooler
<b>Barometric pressure correction</b>	Flash point is automatically corrected to barometric pressure		Flash point is automatically corrected to barometric pressure	
<b>Flash detection</b>	Thermocouple		Thermocouple	
<b>Sample temperature</b>	Pt100		Pt100	
<b>Test place</b>	1 (standardized test insert with multi-detector included)		1 (standardized test insert with multi-detector included)	
<b>Safety</b>	Overheat protection, automatic shut-off   Detects a "flash" outside the cup   Test aborted by warning message		Overheat protection, automatic shut-off   Detects a "flash" outside the cup   Test aborted by warning message	
<b>Calibration</b>	User self-made sample-temperature-sensor calibration: dynamic against certified liquid-in-glass IP-thermometer or static by reference resistors   Barometric-pressure-sensor calibration		User self-made sample-temperature-sensor calibration: dynamic against certified liquid-in-glass ASTM-thermometer or static by reference resistors   Barometric-pressure-sensor calibration	
<b>Handling</b>	Splash-proof membrane touch-key panel with large LCD   Space-saving footprint		Splash-proof membrane touch-key panel with large LCD   Space-saving footprint	
<b>Documentation</b>				
<b>Memory</b>	99 tests		99 tests	
<b>Interfaces</b>	2x RS232		2x RS232	
<b>Display</b>	Splash-proof membrane touch-key panel with large LCD		Splash-proof membrane touch-key panel with large LCD	
<b>Requirements and dimensions</b>				
<b>Power supply</b>	115 V/230 V, 50 Hz/60 Hz, 180 W	115 V/230 V, 50 Hz/60 Hz, 150 W	115 V/230 V, 50 Hz/60 Hz, 180 W	115 V/230 V, 50 Hz/60 Hz, 150 W
<b>Gas supply</b>	50 mbar of propane or butane		50 mbar of propane or butane	
<b>Dimensions</b>	230 mm x 470 mm x 470 mm (W x D x H)		230 mm x 470 mm x 470 mm (W x D x H)	
<b>Weight net</b>	8 kg		8 kg	



Technical specifications	PMA 5	CLA 5
<b>Test programs</b>	ASTM D93 A+B+C   ISO 2719 A+B   JIS 2265-3 A+B   IP 34 A+B   GOST R EN ISO 2719   15 individually designable test programs	ASTM D92   ISO 2592   JIS K 2265-4   AASHTO T48   FTM 791-1103   IP 36   GOST 4333   10 individually designable test programs
<b>Operation</b>		
<b>Configuration</b>		
<b>Application range</b> (°C/°F selectable)	Up to 405 °C	Up to 400 °C
<b>Ignition type</b>	Gas and electric (interchangeable)	Gas
<b>Stirring speed</b>	According to method or user-defined	–
<b>Heating rate</b>	According to method or user-defined	According to methods, programmable and pre-heat mode
<b>Cooling</b>	Built-in forced air (fan)	Built-in forced air (fan)
<b>Barometric pressure correction</b>	Flash point is automatically corrected to barometric pressure	Flash point is automatically corrected to barometric pressure
<b>Flash detection</b>	Thermocouple	Ionization detector
<b>Sample temperature</b>	Pt100	Pt100
<b>Test place</b>	1 (standardized test insert with multi-detector included)	1 (standardized test insert)
<b>Safety</b>	Overheat protection, automatic shut-off   Automated fire-extinguishing system   A potential-free alarm relay contact is also available to connect a fire suppression or remote alarm system   Password protection   Detects a "flash" outside the cup   Test aborted by warning message	Overheat protection, automatic shut-off   Test aborted by warning message
<b>Calibration</b>	User self-made sample-temperature-sensor calibration: dynamic against certified liquid-in-glass ASTM-thermometer or against up to 21 user-defined temperature points from an external calibration certificate or static by reference resistors   Barometric-pressure-sensor calibration	User self-made sample-temperature-sensor calibration: dynamic against certified liquid-in-glass ASTM-thermometer or against up to 21 user-defined temperature points from an external calibration certificate or static by reference resistors   Barometric-pressure-sensor calibration
<b>Handling</b>	Splash-proof membrane key panel with color display   Jog shuttle with LED indication for input of test parameters, sample name and program selection   Selection of °C or °F, as well as further test parameters   Multi-language user support (English, German, French)   Progress of test displayed in different colors (user-defined)   The jog shuttle and 4 softkeys underneath the display are used for operation	Splash-proof membrane key panel with color display   Jog shuttle with LED indication for input of test parameters, sample name and program selection   Selection of °C or °F, as well as further test parameters   Multi-language user support (English, German, French)   Progress of test displayed in different colors (user-defined)   The jog shuttle and 4 softkeys underneath the display are used for operation
<b>Documentation</b>		
<b>Memory</b>	1000 tests, 20 operator names and 100 samples	1000 tests, 20 operator names and 100 samples
<b>Statistics</b>	Mean, Min, Max, Repeatability	Mean, Min, Max, Repeatability
<b>Interfaces</b>	3x USB, 1x RS232, 1x LAN	3x USB, 1x RS232, 1x LAN
<b>Input options</b>	Optional keyboard/bar code reader	Optional keyboard/bar code reader
<b>Display</b>	5.7" QVGA color; real-time measurement displayed	5.7" QVGA color; real-time measurement displayed
<b>Requirements and dimensions</b>		
<b>Power supply</b>	115/230 V, 50/60 Hz, 1000 W	115 V/230 V, 50 Hz/60 Hz, 600 W
<b>Gas supply</b>	Test flame: 50 mbar of propane or butane   Fire extinguisher: 6 bar to 12 bar of nitrogen or carbon dioxide	50 mbar of propane or butane
<b>Dimensions</b>	230 mm x 410 mm x 460 mm (W x D x H)	230 mm x 390 mm x 460 mm (W x D x H)
<b>Weight net</b>	14 kg	12 kg

Technical specifications of PMA 4 SC and PM 4: Next page

# Specifications

## PMA 4 SC Standard Methods

ASTM D93 A+B+C, ISO 2719 A+B, JIS K 2265-3, IP 34 A+B

Technical Specifications	
Application range	up to 405 °C (°C/°F selectable)
Test places	1 to 12
Ignition	Gas and electric (interchangeable)
Heating	According to method or user-defined
Stirring	According to method or user-defined
Cooling	Built-in forced air (fan)
Flash detection	Thermocouple
Sample temperature	Pt100 glass probe
Barometric pressure correction	Automatic correction
Safety	Overheat protection, automatic shut-off, fire-extinguishing system, detects a "flash" outside the cup, test aborted by warning message
Interfaces	Depending on PC configuration
Gas supply	<ul style="list-style-type: none"><li>▶ Test flame: 50 mbar of propane or butane</li><li>▶ Fire extinguisher: 6 bar to 12 bar of nitrogen or carbon dioxide</li></ul>
Power supply	115 V/230 V, 50 Hz/60 Hz, 1000 W
Dimensions	900 mm x 490 mm x 620 mm (W x D x H)
Weight	35 kg



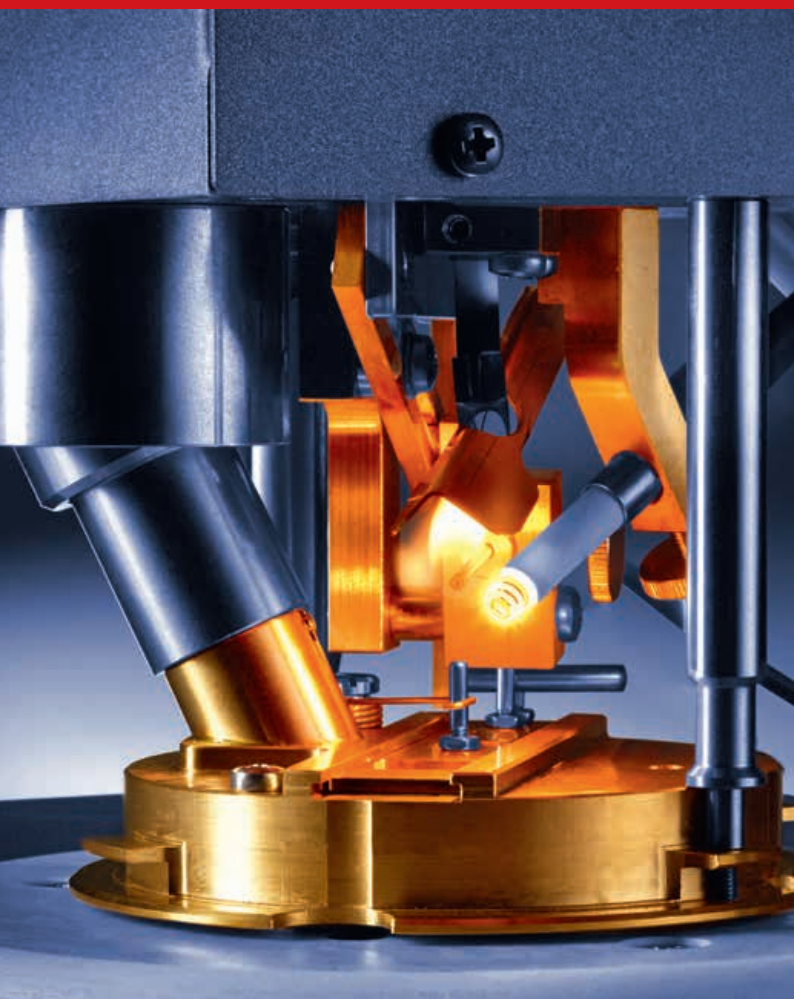
## PM 4 (semi-automatic) Standard Methods

Petroleum products: ASTM D93 A+B, ISO 2719 A+B, JIS K 2265-3, IP 34 A+B

Technical Specifications	
Application range	40 °C to 360 °C (°C/°F selectable)
Ignition	Gas and electric (interchangeable)
Heating	Stepless control
Stirring	120 rpm and 250 rpm
Cooling	Built-in forced air (fan)
Safety	Overheat protection, automatic shut-off
Gas supply	50 mbar of propane or butane
Power supply	230 V or 115 V, 50 Hz/60 Hz, 850 W
Dimensions	230 mm x 470 mm x 460 mm (W x D x H)
Weight	10 kg



# Go Beyond the Conventional Scope



## Extended Measuring Range for ABA 4 and TAG 4

Thanks to state-of-the-art Peltier element technology two cooling versions are available for ABA 4 and TAG 4: an economical version with internal air cooling for flash point measurements from +10 °C to +110 °C and a low-temperature version with a low-cost external liquid cooling from -30 °C to +110 °C. This enables you to go beyond the conventional scope of the method.

ABA 4 and TAG 4 are suitable for flash point applications on jet fuels, solvents, chemicals etc. and give you the choice between gas or electric ignition as well as conducting both static and dynamic Pt100 sample calibration. ABA 4 and TAG 4 also provide automatic barometric pressure correction and thermocouple flash point detection.



## More applications – High safety: Versatile CLA 5

Only the Anton Paar Cleveland open-cup (COC) flash and fire point tester CLA 5 measures flash points of silicone samples without any problems.

CLA 5 is also commonly used for flash and fire point applications of lubricants or bituminous material. It automatically measures and describes the properties of a sample in response to heat and a test flame under controlled conditions. The flash point measures the tendency to form a flammable mixture with air while the fire point indicates the tendency of sustained burning.

For skin forming bituminous materials, ease of use is enhanced by an optional automatic skin removal kit. CLA 5 meets the highest safety standards. In addition to overheat protection and automatic heat shut-off during the test, an optional stainless steel sample temperature sensor Pt100 increases operating safety.

