OPEN CUP FLASH POINT TESTER

PE-TVO

Cleveland method, method A
ASTM D 92, GOST 4333

Data Sheet
Operating Manual

4215-036-23060993-2007 RE

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DEFINITION ACCORDING TO GOST 4333

Open cup flash point of oil product.	The minimum temperature at which product vapors (heated under conditions established by the Standard) will form mixture with environment air, which will flash when flame is put to it.
Ignition point of oil product.	The minimum temperature at which product (heated under conditions established by the Standard) will ignite when flame is put to it and will burn for at least 5 s.

1. GENERAL INSTRUCTIONS

1.1. This document certifies parameters and technical specifications of the open cup flash point tester PE-TVO, which are guaranteed by the Manufacturer.

1.2. The document contains main specifications of the instrument and establishes rules of its operation, adherence to which will provide for fault-free operation of the instrument.

1.3. Requirements of the international standard ASTM D92 and GOST 4333-87 are considered in the design.

1.4. The Manufacturer performs guarantee service, maintenance and minor repairs of the tester.

2. PURPOSE

2.1. The tester PE-TVO is intended for usage as laboratory equipment to perform open cup flash point determination of oil products according to method A ASTM D92 and GOST 4333-87.

3. PRINCIPLE OF OPERATION

3.1. Principle of the tester PE-TVO operation is that the cup with analysed sample is heated with specified speed and the burner flame is set to the sample at temperature intervals, which are prescribed by the Standard. The lowest temperature, at which vapors of investigated material inflame, is determined as flash point.

4. CONSTRUCTION

4.1. The tester PE-TVO (Figure 1) consists of the body with built-in heater, gas supply unit, and microprocessor control and indication unit.

The test cup is made of Brass L-59 according to dimensions requirements of ASTM D92. For easy installation, the cup is equipped with lightweight handle, which is fastened to the flange.

The upper working panel is made of corrosion-resistant, heat-resistant steel 12XH9T, where following elements are installed: heater, ignition device driven by stepper motor under control of microprocessor, gas ignition device, and thermometer holder.

Figure 1

The front faceplate is equipped with buttons for the heater power control, button for starting and stopping of testing START/STOP, heater control button , button for starting delivery and ignition of gas GAS.

Information concerning set power of electric heater is displayed on built-it liquid-crystal illuminated display.
LED indicators of the tester units' condition are located under the indicator. The power supply indicator , gas feed indicator , indicator of voltage supply to the heating element .

Following is located on the rear wall of body: Mains power supply connector, fuse 0.25 A, line circuit breaker.

Right side of the instrument is equipped with heater cooling fan and nozzle for de-livery of gas from gas network or gas cylinder.

Temperature is adjusted manually using the electronic power regulator.

4.2. The open CUP flash point tester PE-TVO was submitted for predelivery inspection, adjusted and packaged into transportation crate.

5. Technical Specification

5.1. Maximum heating temperature, °C. .....up to 370

5.2. Power supply voltage from AC mains
with frequency of 50 Hz, V ..... 220± 22

5.3. Power consumption, no higher than, VA..... 1000

5.4. Instrument weight, kg 5

5.5. Service life, years..... at least 5

5.6. Operating conditions:
5.6.1. Air temperature, ^{o}C.....-15÷35
5.6.1. Relative humidity, % .....-30÷90

5.7. Overall dimensions, mm:
5.7.1. Length 330
5.7.2. Width 250
5.7.3. Height..... 165

5.8. Range of flash point determination, °C.....25-370

5.9. Ignition device, type.....gas

5.10. Control of electric heating power .....electronic

5.11. Automatic passage of burner above surface of sample at set speed.

5.12. Availability of gas network or cylinder (methane, propane/butane) is required.

6. SCOPE OF DELIVERY

6.1. The open cup flash point tester PE-TVO
complete with cup, pcs.. 1

6.2. Thermometer TH-2 acc. to GOST 400, pcs..... 1

6.3. Template for flame adjustment, pcs..... 1

6.4. Data Sheet, Operating Manual, copies 1

6.5. Packaging crate, pcs. 1

7. PERFORMING OF TEST

7.1. Preparation for test (according to GOST 4333-87)

7.1.1. Preparation of sample.

7.1.1.1. Thoroughly and cautiously stir a sample.

7.1.1.2. Samples of hard oil products shall be melted preliminary. Temperature of sample after heating shall be less than suspected flash point by at least 56°C.

7.1.1.3. Tested oil product, which contains water, shall be dried by shaking with one of drying agents at room temperature. Oil products with flash point less than 100°C shall be dried at temperature no higher than 20°C. Viscous oil products (viscosity at 100°C is above 16.5 mm^2/s) shall be dried at temperature no higher than 80°C.
Then filter and decant samples.

7.1.2. Preparation of the tester PE-TVO

7.1.2.1. Remove the instrument from the packaging and install it onto horizontal table in place, where there are no noticeable drifts of air and flash would be clearly visible.
Prior to the first test it is necessary to install the ignition device and adjust its movement using the button 🔥 ⇨ .
To protect from air drift, cover the instrument on three sides by screen or shield. Prior to each test, the instrument shall be cooled.

7.1.2.2. If working with toxic products or products, which contain aromatic hydrocarbons (pyrolysis products) and their vapors are toxic, and then place the instrument together with screen or shield into exhaust hood. When the temperature is by 56°C less than suspected flash point, support air movement under exhaust hood without strong drifts above the cup. Therefore, work with closed upper shutter of the ventilation device of exhaust hood.

7.1.2.3. Wash the cup by solvent prior to each test. Remove carbon deposits using metal brush. Then wash the cup by cool dis-

tilled water and dry in open flame or by hot electric plate. Cool the cup down to temperature at least less by 56°C than suspected flash point, and then place it onto heating element of the tester PE-TVO.

7.1.2.4. Place the thermometer strictly in vertical position into the cup, so lower end of the thermometer will be at distance of 6 mm from the cup bottom and at the same distance from the cup center and walls.

7.1.2.5. It is recommended to inspect instruments and correctness of determinations results using the state standard reference samples GSO TOT 4407-88 - GSO TOT 4410-88.

7.2. Performing of Test

7.2.1. Fill the cup by oil product, so its upper meniscus will be exactly at the mark. If the cup is filled above the mark, remove excess oil product by pipette or other appropriate appliance. Remove air bubbles from the sample surface. Wetting of the cup walls above liquid level is not allowed.

7.2.2. Use the heater power control buttons to set such power, so the initial phase of heating will be performed at speed of 14-17°C per minute. When the temperature will reach value, which is approximately by 56°C less than suspected flash point, adjust heating speed, so for 28°C prior to flash point the oil product will be heated at speed of 5-6°C per minute.

7.2.3. The ignition device, which is driven by stepper motor, shall be moved to the gas ignition device and adjust it, so diameter of flame would be approximately 4 mm. Flame shall be compared to gage (ball, template), which is included into the tester set. To ignite gas, continuously press the button GAS. Gas feed is possible, only when heating power of 1% and higher is achieved, and it will be stopped when button STOP is pressed or when heating power is equal to 0%.

7.2.4. Starting with temperature, which is at least by 28°C less than flash point, use ignition device each time, when sample temper-

ature increases by 2°C. When the button is pressed, flame of the ignition device moves horizontally without stops above the cup edge. Flame is passed above the cup center in one direction for 1 s.

After subsequent stage of temperature increase, press the button again to move flame in reverse direction.

7.2.5. The temperature, which is indicated by the thermometer when the first blue flame has appeared over part or whole surface of tested oil product is assumed as the flash point.

If flash is unclear, it shall be confirmed by subsequent flash after 2°C.
Blue circle (halo), which sometimes forms around ignition flame, shall not be taken into consideration.

7.2.6. To determine the ignition point, the sample heating continues at speed 5-6°C per minute, then test is repeated with flame of ignition device after each 2°C of oil product temperature increase.

7.2.7. The temperature, which is indicated by the thermometer when tested oil product ignites when ignition device flame is put to it and continues to burn for at least 5 s is assumed as the ignition point.

7.2.8. Press the STOP button on the tester front panel. Indicators of heating and (gas) will go off, gas supply will stop and fan will be turned on in order to speed up cooling of the heater.

7.2.9. Remove the cup with oil product from the heating element.

7.2.10. Cooling of the instrument PE-TVO is mandatory after each test, according to requirements to item 2.1.2.1 of GOST 4333-87 and construction of the instrument. Failure to comply with this rule may result in shortened operation life of the instrument.

7.3. Processing of Results

7.3.1. If barometric pressure during test is less than 95.3 kPa (715 mm Hg), then it is necessary to introduce corresponding compensations from Table 1 (GOST) to determined values of flash point and ignition point.

Table 1

Barometric pressure, kPa (mm Hg)	Compensation, °C
From 95.3 to 88.7 (from 715 to 665)	+2
" 88.6 " 81.3 (" 664 " 610)	+4
" 81.2 " 73.3 (" 609 " 550)	+6

7.3.2. The arithmetic mean value of two determinations results (rounded to nearest integer and expressed in Celsius degrees) is assumed as the test result.

8. SAFETY PRECAUTIONS

8.1. As regards the level of protection against electric shock, the device is manufactured according to class 1.

8.2. The device shall be connected to the earthing loop by means of a three-pole plug or by wire to the earthing loop.

8.3. It is strictly prohibited to work with the unearthed instrument as well as use the water/gas-supply, flammable liquids pipelines, sewage networks, earthing connectors of lightning dischargers, etc. as earthing system. It is prohibited to use adapter to connect to two-pole sockets without earthing contact.

8.4. While testing of toxic product or product, which evolves toxic materials during de-composition or burning, it is necessary to perform test adhering to safety rules, which are implemented for operation with toxic materials. In such case, the instrument shall be in-stalled under exhaust hood or use appropriate gas mask and decontamination means.

8.5. Remove the cup with oil product from the heating element when flash point is determined.

9. PACKAGING, TRANSPOTRATION, STORAGE

9.1. The tester PE-TVO in transportation package can be transported by any types of closed transportation means.

9.2. Store the tester PE-TVO in closed position - in the transportation package under environment temperature from +5 to + 40°C and relative air humidity up to 98%.

10. WARRANTY

10.1. Ecohim Co. Ltd. guarantees the compliance of the product with the requirements stipulated in item 5 hereof provided the consumer adheres to the operation, transportation and storage conditions.

10.2. Within the guaranteed service life, the free-of-charge repair or replacement of the device on the claim is provided in case the consumer has observed the storage, transportation and operation rules.

10.3. The warranty maintenance shall be only performed by the authorized service centers.

11. CLAIMS INFORMATION

11.1. In case of revealing any faults within the guaranteed service life or incompleteness when unpacking the product, the consumer shall submit the claim report to the manufacturer's address:

Ecohim Co. Ltd.
22 17th Line, building I, Suite 406 Vasilyevsky Island,
Saint Petersburg 199178;
Tel./Fax: +7 (812) 322-96-00, 449-31-22, 449-31-23;
E-mail: info@ecohim.ru, URL: www.ecohim.ru

11.2. No claims for the device may be submitted:

- on expiration of the warranty period;
- if the consumer has broken the operation, storage and transportation rules provided in the operating documentation.

12. CERTIFICATE OF ACCEPTANCE

The open cup flash point tester PE-TVO for oil products serial number _____ has been manufactured and accepted in accordance with the statutory requirements of the state standards and current technical documentation and recognized to be ready for service.

Date of manufacture _____

Stamp of the Technical Control Department

Inspector _____

APPENDIX 1 – INFORMATION ON THE REPAIRS PERFORMED

Data of failure	Nature and causes of the failure	Note of the organization having performed the repair	Remarks