Koehler
INSTRUMENT COMPANY, INC.

K4831X
Total Sediment Tester

Operation and Instruction Manual

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Petroleum Testing & Analysis Instrumentation • Custom Design & Manufacturing

USER MANUAL

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NOTICE

Only the operators that have the knowledge of the method or are able to establish internal procedures are authorized to use the apparatus.

The qualified operators are however not allowed to work on the device to:

- Perform reparations
- Modify the components
- Use the apparatus for different uses from those imposed by the norm ASTM

For extraordinary maintenance operations (replacement of components, modifications of the system, replacement of cables, etc.) it is essential to contact the manufacturer.

Whoever intervenes with the device will act under his own responsibility and cause the immediate suspension of the warranty.

Before proceeding with a maintenance service, remove the plug from the socket.

The manufacturer declines every kind of responsibility for all the operations not in conformity to the aforesaid dispositions or performed by personal without qualification.

The operations of demolition must be entrusted to skilled staff.

The structure and the various components, if unusable, must be demolished and divided according to their typology and sent to the center of harvest for the disposal and the recycling.

GUARANTEE

The warranty covers the apparatus from manufacturing defects for a period of one (1) year.

During the warranty period the manufacturer will replace and/or will repair, free of charges, all the components that will present a manufacturing defect or malfunction. Spent the terms above, the warranty declines and the assistance will be realised debiting the cost of the components, of the technical intervention, of the transport of the materials and the bed and board and travelling expenses if any.

The manufacturer is not responsible for the possible damages caused to the device due to wrong connections to the power supply (if any).

In case of extraordinary maintenance, personally realised by the customer, during the warranty period, the guarantee will immediately be suspended.

The manufacturer reserves himself the right to bring in any moment and without warning: changes and innovations, respecting the ASTM norms, without nobody can advance complaint.

The warranty is not valid in the case of damages caused by:

- wrong use of the device
- anomalies of the power supply system (if any)
- negligence of the operator
- atmospheric and geophysical agents, vandalism, wartime events
- transport
- use of unoriginal spare parts.

SAFETY INFORMATION AND SUGGESTIONS

THE APPARATUS DOESN'T CONSTITUTE A POTENTIAL DANGER FOR THE OPERATORS which USE IT OR TO those who work IN THE SURROUNDING ZONES; NOTWITHSTANDING THIS, WE INVITE TO FOLLOW THE INDICATIONS BELOW.

1. Avoid to lean on the apparatus any kind of material
2. Oversee the operating zone in order to avoid the approaching of operators without qualification.
3. Always wear suitable clothes

4. Always use masks, protective glasses and gloves in conformity to the normative in force.

5. Avoid to send water-spout on the device.
6. Always pay attention when using the apparatus.
7. It is severely forbidden to smoke in the vicinity of the apparatus.

In compliance with art. 13 of the Legislative Decree dated 25 July 2005, no. 151 "Implementation of the Directives 2002/95/EC, 2002/96/EC and 2003/108/EC on the restriction of the use of certain hazardous substances in electrical and electronic equipment, as well as waste disposal".

The symbol of the crossed-out wheeled bin on the equipment or its packaging indicates that the product must be disposed of separately from other waste at the end of its operational life.

The differentiated collection of this equipment arrived at the end of life is organized and managed by the manufacturer. The user that intends to trash this equipment will have to contact the manufacturer and follow the procedure that it has taken to allow separate collection of the apparatus arrived at the end of life.

Appropriate differentiated collection for the dismantled appliance being subsequently sent out for recycling, treatment and for environmentally friendly disposal, contributes to the prevention of possible negative effects on the environment and on human health, and encourages re-employment and/or recycling of the materials the appliance is made of. Specific administrative sanctions provided for by current regulations will be applied for illicit disposal of the product by the user.

TECHNICAL SPECIFICATIONS OF THE DEVICE

Dimensions:	36x70x62 cm. (WxDxH)
Weight:	8 Kg.
Working temperature:	from 0 to 50°C
Storage temperature:	from -10 to 70°C
Ambient relative humidity:	lower than 90% HR not condensing

ACCESSORIES

K48319-10	Steam Generator
K48319-11	Vacuum Pump
K48319-14	GFA filter, pack of 100 pcs
K48319-9	Thermometer +95°C …+105°C

SPARE PARTS

K48319-14	GFA filter, pack of 100 pcs
K48319-12	Sintered disc, pack of 2 pcs

1. Sample Preparation

1.1 Mix the whole sample, as received, thoroughly using a high speed mixer when practicable, for 30 s. In all cases a sample taken on a glass or PTFE rod dipped to the bottom of the container must show a homogeneous appearance.
For fuels with a high wax content (high pour point), or of very high viscosity, the sample must be heated before stirring. The temperature must be either 15°C above the pour point in the case of low viscosity fuels, or that equivalent to 150 to 250 cSt in the case of high viscosity fuels. In no case should the temperature exceed 80°C.

2. Filter Preparation

2.1 For each test, dry two filter media for 20 min in the oven at 110°C. Transfer each paper, separately, rapidly to a numbered weighing bottle and allow to cool in the cooling vessel to room temperature (5 to 10 min).
Where two-pan balances are used, weigh each weighing bottle plus filter medium by the tare method against an empty similar bottle, to the nearest 0.001 g.

NOTE 1— Caution: The Whatman GF/A filter media are fragile and are to be handled with care. Before use, check each medium for consistency, and the possible presence of small defects (holes).

NOTE 2— For convenience, it is useful to have a number of weighing bottles dedicated to the procedure, the lightest of which is chosen as the tare. All weighing bottles should be stored in a desiccator in the vicinity of the balance. Do not place these weighing bottles in the oven since their weights are in equilibrium with the desiccant

3. Apparatus Assembly

3.1 Before use, check that the filter support screen is clean. If necessary, the screen must be cleaned by boiling in a high boiling point aromatic solvent. When more than 2 % of the sinter area remains blocked by particulate matter after such cleaning, discard the screen and install a new one.

3.2 The filtration unit must be clean and dry before assembly. Stack the two previously dried and weighed filter media on top of the sinter support with the mesh imprint side down, using forceps, placing the one from the lower numbered weighing bottle on the bottom. Apply slight vacuum to aid in centering the filter media, and place the top portion of the filtration apparatus carefully on to the media before clamping.
Shut off the vacuum and pass steam at 100 ±1°C through the heating/cooling coils for 10 min prior to sample addition.

4. Sample Addition

4.1 Into a 30 mL beaker, pour approximately 11 g of the fuel sample prepared as described in 9.1 and weigh to the nearest 0.01 g.
Connect the vacuum source and apply vacuum to an absolute pressure of 40 ±2 kPa minimum (61.3 kPa vacuum). Heat the contents of the beaker to 100 ±2°C. Then transfer the contents at 100 ±2°C (Note 3) to the center of the filter medium, taking care that no sample touches the walls during transfer (Note 4). Reweigh the beaker to the nearest 0.01 g. The quantity transferred should be 10 ±0.5 g. When filtration is not complete in 25 min, discontinue the test and repeat using 5 ±0.3 g of sample. If filtration is still not complete in 25 min, report the result as filtration exceeds 25 min.

NOTE 3— It is expedient to weigh the beaker plus stirrer plus temperature measurement device before and after transfer to avoid errors incurred by attempting to obtain a net weight. Any convenient means of heating the fuel sample to 100 ±2°C may be used, such as hot plate, water or oil bath, or an oven when equipped with a suitable stirrer. Samples that overheat above 105°C must be discarded and not reused.

NOTE 4— For samples of high viscosity or high sediment, level fi ltration will be aided by small stage or even dropwise addition. It is preferable to avoid complete coverage of the fi lter medium with unfi ltered oil sample.
For samples of low fi ltration rate the pressure of 40 ±2 kPa should be maintained for the 25-min period.

5. Filter Washing

5.1 When the filtration is complete and the upper filter medium appears dry, continue the steam and vacuum for a further 5 min. Discontinue the steam supply and cool the apparatus by passing tap water through the coils. Wash the filtration unit carefully with two portions of 25 ±1 mL of the wash solvent from a syringe or graduated wash bottle with a fine nozzle, taking care to remove any adhered sample from the wall of the upper part of the apparatus. Carefully remove the top portion of the filtration unit and wash the rim of the filter with a further 10 ±0.5 mL of the wash solvent in a similar manner. Finally wash the whole of the filter medium area with 10 ±0.5 mL of *n*-heptane.

NOTE 5— If the sample filters very rapidly, the vacuum should be released before the first solvent washing, to ensure complete coverage of the filter medium area by solvent. The vacuum should then be gently reapplied for the subsequent operations.

6. Apparatus Disassembly

6.1 After the filter medium appears dry, discontinue the vacuum supply. Using the forceps, carefully remove each filter medium separately and transfer them to the oven at 110°C. Dry for 20 min and quickly transfer them to the same numbered weighing bottles as used in 2. Allow them to cool in the cooling vessel to room temperature (5 to 10 min) and reweigh them (against tare) to the nearest 0.0001 g.

7. Calculation

7.1 Calculate the mass percentage of total sediment to the nearest 0.01% m/m using the following equation:

$$S=(M5 - M4) - (M3 - M2) / 10\,M1$$

where:

S = total sediment, % m/m,
*M*1 = mass of sample, g,
*M*2 = mass of lower filter medium before filtration, mg,
*M*3 = mass of lower filter medium after filtration, mg,
*M*4 = mass of upper filter medium before filtration, mg, and
*M*5 = mass of upper filter medium after filtration, mg.

8. Report

8.1 Report the total sediment by hot filtration as the average of duplicate determinations, to the nearest 0.01 % m/m. If a 5-g sample has been used, report the results as total sediment (5 g) by hot filtration. If filtration is not complete within the specified 25 min, report the results as filtration time exceeds 25 min.

8.2 Test Report—The test report shall contain at least the following information:

8.2.1 The type and identification of the product tested,
8.2.2 A reference to this test method,
8.2.3 The result of the test (see 8),
8.2.4 Any deviation, by agreement or otherwise, from the standard procedures specified (see 8), and
8.2.5 The date of the test.