

# Aethalometer<sup>®</sup>

## Rack Mount Chassis - Models AE22 and AE31



### Measurement Principle

Incremental optical transmission absorption due to aerosol deposit collected continuously on quartz fiber filter.

### Analytical Method

AE-22 ('Dual-Wave'):

Combination optical absorption measurement at 880 nm ('EC'), and 370 nm (designated as 'UVPM', interpreted as an indicator of aromatic organic compounds such as are found in tobacco smoke, PAH mixtures, wood and biomass-burning smoke, etc.).

AE-31 ('Spectrum'):

Simultaneous measurement at 7 wavelengths for studies of aerosol optical absorption, atmospheric optics, radiative transfer etc.: 370, 470, 520, 590, 660, 880 and 950 nm. Special alternative wavelength set optical sources are available upon request.

### Interpretation

Optical absorption is interpreted in real time as concentration of Elemental Carbon ('EC', also called 'Black Carbon - BC').

### Specificity

No other aerosol species has optical absorption even 0.001 times that of Elemental Carbon in the visible range.

### Time Resolution (User setting)

AE22: 1 hour to 15 seconds

AE31: 1 hour to 2 minutes

### Intercomparison

Aethalometer readings compare 1:1 with chemical analysis for EC on parallel filter samples.

### Sensitivity

Proportional to flow rate, inversely proportional to time resolution - approximately 0.1 ug/m<sup>3</sup> @ 1-minute resolution @ 3 LPM.

### Noise Cancellation:

Short-timebase data may be integrated over longer periods to recover data exactly equivalent to higher-sensitivity operation at longer timebases.

### Flow Rate (User setting)

2 to 6 LPM optimum, monitored by mass flow meter. Internal pump provides 2 to 6 LPM, stabilized by closed-loop control. Rear panel connector for external pump.

### Aerosol Sizing

Instrument collects all aerosol presented at inlet port. Size-segregating inlets (impactors, cyclones etc.) may be attached.

*Note:* In almost all situations, the vast majority of EC aerosol is in the PM<sub>2.5</sub> submicron aerodynamic size range (i.e. less than 2.5 µm).

### Sampling Medium

Reinforced quartz fiber tape. Tape advances automatically to avoid optical saturation, advances 1 cm typically once every few hours depending on concentration and flow rate. 10-meter roll of tape usually lasts from months to years at most locations.

### Sample Retention

Aerosol is collected on quartz fiber tape. Subsequent chemical analysis can be performed on the sample spots following collection.



2020 Stuart Street  
Berkeley, CA 94703

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fax +1 510.845.7137

[www.mageescientific.com](http://www.mageescientific.com)

## Sample Collection Area

Sample is collected on a defined spot on the filter fiber tape.

*Options:* 'High Sensitivity' option provides a small, concentrating spot for optimal performance at locations of low concentration

'Extended Range' option provides a larger, dispersing spot for optimal performance in areas of high concentration.

## Internal Control

All functions controlled by embedded single-board computer. Program and operating parameters stored in non-volatile RAM.

## Data Output

Digital data is transmitted from rear COM port. Analog output connector represents BC data as 0~5 volt DC signal, scalable in software.

## Data Recording

Data are written to recording medium once every timebase period.

*Option*

Flash memory drive is standard.

Floppy disk may be substituted.

## Display and Interface

4-line display screen (date, time, BC etc.); status indicated by color-coded LED's (OK, initializing, problem etc.); keypad for menu selection entries.

## Attention Required

Instrument is completely automatic. No user attention is required at all while operating. Starts and runs automatically upon switching on. Recovers automatically from power interruptions.

## Consumables Required

Filter tape (sample): 1 to 4 rolls per year, depending on concentrations, and cartridge filters (bypass flow; flow meter protection): approximately one per year, each.

## Periodic Maintenance

We recommend a flow rate verification every three months, and cleaning the inlet assembly once per year.

## Reliability

Aethalometers have been operating at hundreds of urban, regional, rural and remote locations on all continents, continuously since 1986.

## Size

Instrument constructed in fully-enclosed 19" rack mount chassis, 10.5" (6U) high, 12" deep. Additional benchtop cabinet optional.

## Weight

Approx. 40 lbs (18 kg).

## Power Requirement

100~240 VAC 50~400 Hz, autoswitching : 40 watts.

## Operation Environment

Specified for typical indoor conditions. Not inherently weatherproof - additional enclosure recommended.

## Temperature

0 ~ 40 °C operating. Electronics have active temperature stabilization.

## Vibration

No effect for vibration up to levels typical of car at highway speed.

## Initialization

Approximately 15 minutes required from power-up to valid data.





**UNITED STATES DEPARTMENT OF COMMERCE**  
**National Oceanic and Atmospheric Administration**  
Office of Oceanic and Atmospheric Research  
Earth System Research Laboratory  
325 Broadway – David Skaggs Research Center  
Boulder, Colorado 80305-3337

**DEC 20 2007**

Dr. V. Martyschenko  
Russian Federal Service for  
Hydrometeorology and  
Environmental Monitoring  
Novovagankovskiy per, 12  
123995 Moscow, Russian Federation  
RUSSIA

Dear Dr. Martyschenko:

In the Protocol, signed by Brigadier General John Kelly and Dr. A. Bedritsky on March 3, 2006, one of the Statements of Work identified Project 4.1 as “Establishing a Modern Weather Station and Research Observatory in Tiksi, Russia”. This project is a very important cooperative activity between the National Oceanic and Atmospheric Administration (NOAA) and Roshydromet within the framework of the International Polar Year 2007/08.

In this letter we would like to communicate NOAA’s intention to loan an aethalometer to the Roshydromet Department of Monitoring & Environmental Pollution & Polar/Marine Studies until August 15, 2009. This activity will support joint U.S. and Russian science interests in supporting the International Polar Year.

The entry of this equipment into Russia calls upon the protocols established by implementation agreement No. 01/20-2005 on Scientific and Technical Cooperation under the Government of the Russian Federation and the Government of the United States of America on Science and Technology Cooperation. Specifically we would like to invoke Article Nine of this agreement to “facilitate duty free entry for necessary materials and equipment provided pursuant to this agreement for use in joint activities.”

Sincerely,

Alexander E. MacDonald, Ph.D.  
Director



<b>PROPERTY LOAN AGREEMENT AND RECEIPT</b>
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<b>TO: NAME AND ADDRESS OF ACCOUNTABLE PROPERTY MANAGEMENT OFFICE</b> <i>(Submit in triplicate)</i>  MASC Property Unit, MC 413 325 Broadway Boulder, CO 80305	<b>FROM: ORGANIZATION</b> NOAA/ESRL/GMD  <b>SIGNATURE OF AUTHORIZED OFFICIAL</b>  <table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td style="width:70%;"><b>TITLE</b></td> <td style="width:30%;"><b>DATE</b></td> </tr> <tr> <td>Program Management Spec</td> <td>12/20/07</td> </tr> </table>	<b>TITLE</b>	<b>DATE</b>	Program Management Spec	12/20/07
<b>TITLE</b>	<b>DATE</b>				
Program Management Spec	12/20/07				

<b>NAME AND ADDRESS OF BORROWER</b>  Roshydromet, Attn:Valery Martyschenko (+7-495-252-45-11) Dept. of Monitoring & Env. Pollution & Polar/Marine Stud.	<b>SHIPPING ADDRESS</b> <i>(If different from borrowers)</i>  12 Novovagankovsky Moscow 123995
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<b>DATE TO BE LOANED</b> <div style="text-align: center;">01/19/2008</div>	<b>DATE TO BE RETURNED</b> <div style="text-align: center;">01/19/2010</div>
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EQUIPMENT TO BE LOANED		
QUANTITY	DESCRIPTION	COST
1	Aethalometer and accessories (cost depreciated 35%)	\$5,200.00
2	Rolls of filter tape (cost depreciated 35%)	\$130.00

**PURPOSE OF LOAN**

To be used for collaborative activity between NOAA and Roshydromet within the framework of International Polar Year 2007/2008 for "Establishing a Modern Weather Station and Research Observatory in Tiksi, Russia".

- CONDITIONS OF LOAN**
1. The borrower of the above equipment agrees to return same in like condition as received from the National Oceanic and Atmospheric Administration, normal wear and tear accepted, on or before the above return date, unless the loan period is formally extended.
  2. In case of loss or damage beyond repair the National Oceanic and Atmospheric Administration shall be reimbursed at the current price of replacement.
  3. The equipment shall not be loaned or transferred to a third party without the written consent of the National Oceanic and Atmospheric Administration.
  4. The borrower shall account for the equipment whenever so requested.
  5. The right is reserved to cancel the loan or recall the equipment upon \_\_\_\_\_ days notice.
  6. The borrower shall assume all transportation costs involved.
  7. Government saved harmless.
  8. Other conditions:

APPROVED	RECEIVED
LOANING ORGANIZATION <b>NOAA/ESRL/GMD</b>	<i>(Please complete the information below and return original to the Accountable Property Management Office shown above)</i> BORROWING ORGANIZATION
SIGNATURE OF AUTHORIZED OFFICIAL	SIGNATURE OF AUTHORIZED OFFICIAL
TITLE Admin. Officer, GMD, Property Acc. Officer	TITLE
DATE APPROVED	DATE RECEIVED

AETHALOMETER carbon sampler measuring instrument shipping list

Box (16"x19"x26") Weight = 50 Lbs

Box contains additional box and 1 (8"x12") piece of blue foam.

Additional box contains the following:

Packing material:

- 1 piece of 1 ½" x 15 ½" x 23 ½" white closed cell foam (bottom)
- 1 piece of 11" x 7" x 1 ½" " white closed cell foam (side)
- 1 piece of 1 ½" x 10" x 10 ½" " white closed cell foam (side)
- 4 pieces of 12" x 6" x 5" white closed cell foam (corners)
- 1 piece of 1 ½" x 15" x 23 ½" " white closed cell foam (top)
- 1 piece of 15 ½" x 23 ½" x 2 ½" " white closed cell foam (top) with cut-outs

1 Aethalometer United States Government # CD0001443814  
dimensions are 13" x 10" x 17" and blue in color

1 piece of 10mm OD 2 Meter Black tubing

1 6' black 120 VAC black power cable

1 3" x 5" clear bag which contains:

- 1 of 3/8" stainless steel swagelok fitting
- 1 of 3/8" barbed brass fitting
- 1 of 3/8" grey plastic barbed fitting
- 1 of 3/8" grey threaded quick-connect threaded fitting
- 1 of 3/8" red plastic threaded cap
- 1 of 3/8" white plastic barbed lock-connect fitting

1 MAGEE Scientific instrument manual 8 ½" x 11" x 1 ¼"

2 plastic document sleeves

1 contains a sheet of paper

1 contains 2 stapled documents and a test strip

2 Palleflex unique low pressure high capacity Filter tapes.

Type Q250F

# Magee Scientific

1829 Francisco Street  
Berkeley, CA 94703

Invoice No.

2079

Order No.

07102006

## INVOICE

**Bill To:**

Dr. Russ Schnell  
NOAA/ESRL Global Monitoring Div  
325 Broadway R/GMD1  
Boulder, CO 30304

Invoice Date: 7/10/2006

Carrier: Federal Express

FOB Point: Destination

Payment Terms: Credit Card

Currency: USD

Qty	Description	Serial Number	Unit Price	Total
1	Aethalometer 31_Spectru...	224	8,000.00	8,000.00

**Shipping Information**

Tracking Number

Subtotal \$8,000.00

Sales Tax (0.0%) \$0.00

**INVOICE TOTAL \$8,000.00**

**Magee Scientific Company**

<http://www.mageesci.com> [mail@mageesci.com](mailto:mail@mageesci.com)  
tel: +1(510) 845-2801 fax: +1(510) 845-7137



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**FOR OFFICIAL USE ONLY**

**General Information**

Current Registration Status: **Active in CCR; Registration valid until 02/21/2007.**

DUNS: 363019159  
 DUNS PLUS4:  
 CAGE/NCAGE Code: 35UE1  
 Legal Business Name: MAGEE SCIENTIFIC COMPANY  
 Doing Business As (DBA): MAGEE SCIENTIFIC  
 Division Name:  
 Division Number:  
 Company URL: <http://www.mageesci.com>

Physical Street Address 1: 2020 STUART ST  
 Physical Street Address 2:  
 Physical City: BERKELEY  
 Physical State: CA  
 Physical Zip/Postal Code: 94703-2217  
 Physical Country: USA

Mailing Name: MAGEE SCIENTIFIC COMPANY  
 Mailing Address: 1829 FRANCISCO ST.  
 Mailing Address 2:  
 Mailing City: BERKELEY  
 Mailing State: CA  
 Mailing Zip/Postal Code: 94703-1312  
 Mailing Country: USA

Business Start Date: 04/01/1987

**Corporate Information**

Type of Organization  
 Sole Proprietorship

Business Types/Grants

MF - Manufacturer of Goods  
 VW - Contracts and Grants

JWOD Non-Profit Agency  
 No

Magee Scientific Company  
1829 Francisco Street  
Berkeley, CA 94703  
(510) 845-2801

VISA PURCHASE  
CARD #\*\*\*\*\*6663\*  
EXPIRATION DATE : \*\*\*\*\*  
DATE 12-18-2007 # A  
TIME 15:42:21  
SALE 200.00

APPROVED 044928  
AVS: ADDRESS

**PAID**  
*18 Dec 07*

CLERK :  
CUSTOMER ORDER# : Tiksi Aeth tape

ITEM DESC: 2 ROLLS FILTER TAPE

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X \_\_\_\_\_

\*\*\*PLEASE IMPRINT CARD\*\*\*

----- THANK YOU -----