3.0 EXPRESSION OF RESULTS

3.1 METHOD OF CALCULATION

The total of atmospheric dustfall, expressed in grams or milligrams per square metre per 30 days, is given by the formula

$$\frac{m_1 + m_2}{A} \times \frac{30}{d}$$

where

$m_1$ is the mass, in grams or milligrams, of insoluble particulate material collected;

$m_2$ is the mass, in grams or milligrams, of water-soluble material collected;

$A$ is the area, in square metres, of the gauge aperture;

$d$ is the period, in days, over which the sample was collected.

The mass of insoluble material $m_1$ is determined in 2.6.1 on the screened sample.

The mass $m_2$ of water-soluble material is given by the formula

$$\frac{m_3 V_1}{V_2}$$

where

$m_3$ is the mass, in grams or milligrams, of dry material obtained from the aliquot portion of the filtrate obtained in 2.6.1

$V_1$ is the total volume, in cubic decimetres, of the filtrate obtained in 2.6.1

$V_2$ is the volume, in cubic decimetres, of the aliquot portion taken.

The results shall be reported on a 30 day basis and expressed in either grams per square metre per 30 days, or milligrams per square metre per 30 days.

3.2 PRECISION

Under study 1)

3.3 TEST REPORT

The test report shall include the following information:

(a) a reference to this International Standard;
(b) the exposure time and season;
(c) complete identification of the site;
(d) indication of exceptional weather conditions during the exposure period, which may have led to selection of a 15 period;
(e) the results and the method of expression used.

1) It should be noted that gases can be absorbed by the liquid during exposure.

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THE DUST TUBE
HORIZONTAL DEPOSIT GAUGE

1.0 COLLECTION OF ATMOSPHERIC DUSTFALL

1.1 PRELIMINARY OPERATIONS

Before starting exposure, carefully remove all extraneous matter adhering to the deposit gauge and the lid. During preliminary cleaning, washing agents which do not attack the surface of the deposit gauge and the lid may be used. After each preliminary cleaning, rinse the deposit gauge with distilled or de-ionized water in order to remove any remaining extraneous matter.

Tightly seal the cleaned deposit gauge for storage and transport.

Remove the lid at the site and place the deposit gauge in the basket shield.

1.2 EXPOSURE OF THE DEPOSIT GAUGE

1.2.1 CHOICE OF THE SITE

NOTE - The following are general requirements. They may be modified for particular measurement purposes.

The site shall be exempt as far as possible from specific sources of pollution, including chimneys, traffic, trees and dusty ground. It shall be horizontal. The nearest obstacle shall be not closer than 5m. The angle between the gauge aperture plane and the line joining the centre of this plane to the top of any higher obstacle shall be less than 30°.

The site may be either:
(a) an open field;
(b) for built-up areas: a flat, horizontal roof.

In the latter case, the roof selected shall be that of a building of average size and height for the town. The deposit gauge shall be located as near as possible to the centre of the roof.

The results obtained from these two types of sites are not equivalent.

1.2.2 POSITIONING OF THE DEPOSIT GAUGE

The height of the gauge aperture above the surface of the immediate surrounding area shall be 1.8 ± 0.2m. If the site is a roof, however, this requirement does not apply.

It is important that the gauge aperture plane is horizontal.
1.3 ADDITIVES

Sufficient water shall be placed in the deposit gauge at the beginning of exposure to ensure that it will not dry out or overflow during the period of exposure. The amount will depend on the climactic conditions expected during the period of exposure.

In order to depress the freezing point and/or to prevent alga or bacterial growth, an additive may be used. Such additives must not interfere with subsequent analyses.

A 5% (v/v) (initial concentration) solution of 2-methoxyethanol, which is an effective bactericide and algicide, and prevents frost damage, has been found to be suitable. It can be completely evaporated (boiling point: 124°C).

1.4 PERIOD OF EXPOSURE

In general, the period of exposure shall be 30 ± 2 days. According to exceptional conditions (dry or wet weather), it may be reduced to 15 ± 1 days, provided that the characteristics of the method are not changed.

1.5 TRANSPORT

At the end of the period of exposure, the deposit gauges shall be removed from the basket shield. In order that there is no exchange between the contents of the deposit gauge and the outside environment during transport of the sample from the site to the laboratory, the deposit gauge shall be sealed immediately with its lid or, if necessary, placed in a transport container.

1.6 STORAGE

The deposit gauges containing the atmospheric dustfall shall not be stored for more than 14 days before treatment of the sample. During storage, the deposit gauges shall be tightly sealed and kept cool in order to prevent the growth of algae, fungi and other micro-organisms.

2.0 TREATMENT OF COLLECTED ATMOSPHERIC DUSTFALL

2.1 TEST APPARATUS REQUIRED

Flat bottomed evaporating basins of borosilicate glass, having external diameters of 95mm. If the presence of fluoride or other corrosive materials is suspected, use platinum evaporating basins.

Screen of suitable size, made of stainless steel, and having 1mm square apertures, as specified in ISO 2194.

Analytical balance, having an accuracy of 0.1 mg.

Drying oven capable of being maintained at 105°C.

desiccator containing a drying agent, for example dry silica gel or calcium chloride.

2.2 PREPARATION OF APPARATUS

Carefully clean the flat bottomed evaporating basins, and place them in the oven, controlled at 105°C, for 1 hour. Then transfer them to the desiccator, and, when they have cooled to the ambient temperature, weigh them to the nearest 0.1mg.

Check the "zero" of the analytical balance before each series of measurements and after a certain number, such as 10, weighings.

Record the masses of the evaporating basins.

2.3 PROCEDURE

Remove the lid from the deposit gauge and measure the pH of the contents.

Rinse the extraneous matter and any liquids adhering to the lid into the deposit gauge with distilled or de-ionized water. Remove the obviously extraneous matter such as leaves, twigs and insects using tweezers, and, holding them above the deposit gauge, rinse thoroughly with distilled or de-ionized water.

Remove and disperse the extraneous matter adhering to the inside wall and the bottom of the deposit gauge using a rubber policeman.

2.4 SCREENING

Pass the collected material through the screen to remove extraneous matter.

Rinse the inside wall of the deposit gauge with distilled or de-ionized water to ensure the removal of all particles, and pass the rinsings through the screen.

If required, separate account may be taken of extraneous matter retained on the screen which has originated from domestic or industrial processes.

2.5 SEPARATION OF WATER-INSOLUBLE PARTICLES

Separate the water-insoluble particles in the screened sample by

(a) filtering through filter paper, glass fibre or other filter medium, taking all possible precautions to eliminate chemical impurities from the latter;

(b) centrifuging;

(c) other separating techniques.

NOTE - The filtering method is generally recommended because this method permits a simple and common exploitation of results in order to compare the total quantities of atmospheric dustfall. For detailed physicochemical analysis the centrifuging method is recommended.

2.6 DETERMINATION

2.6.1 WATER-INSOLUBLE PARTICLES

Transfer the water-insoluble particles into a flat bottomed evaporating basin and heat to constant mass in the oven, controlled at 105°C. Constant mass is considered to have been attained when the results of two consecutive weighings differ by less than 0.1mg.

After cooling to ambient temperature in the desiccator, weigh the evaporating basin to the nearest 0.1mg.

NOTE - The evaporating basin shall be thoroughly cleaned, rinsed with distilled or de-ionized water and, after drying, stored in a dust-free place.

2.6.2 WATER-SOLUBLE MATERIAL

Determine the amount of water-soluble material in the screened sample on an aliquot portion, for example 100ml, of the liquid filtrate obtained as follows.

Place the aliquot in an evaporating basin and slowly evaporate the water (and, if used, 2-methoxyethanol). Dry the residue in the drying-oven controlled at 105°C and proceed as described in for WATER-INSOLUBLE PARTICLES (Above).