

## SIMPLE ON SITE LEAD ANALYSIS

Lead is now recognised as a serious hazard in our environment. The previous use of lead compounds in paint, pipework, automobile fuels, batteries and industrial products over many years has led to widespread lead contamination of homes and workplaces. Legislation has been progressively introduced to control the problems of lead in the environment.

Today's generation must tackle this recognised risk to safeguard not only our own health, but also the health of our children – and the children of coming generations. To take on this task, professionals in the lead abatement industry need a simple effective means of assessing lead levels

The Palintest SA-5000 Scanning Analyzer is a powerful analytical tool for testing lead levels in:-

- PAINT
- DUST
- AIR
- SOIL
- WATER

The Palintest SA-5000 with its unique disposable electrode technology is a breakthrough in testing for environmental lead. Simple on-site testing is now possible thanks to the Palintest system. Read how this technological breakthrough can help you with lead monitoring.



## TESTING FOR LEAD

Testing for lead could not be easier! The Palintest Scanning Analyzer is simple and safe to use. It features the unique disposable electrode system. The sample is first treated according to an approved protocol. The electrode is then immersed in the prepared sample solution and the instrument does the rest. The lead concentration is displayed in 45 seconds – 3 minutes in the case of water samples. It is simple, specific and precise.



Underlying the simple operation is a wealth of the latest scientific innovation. A real technical breakthrough. The tiny disposable electrode is the result of many years of painstaking scientific research. This multi-layer mini electrode lies at the heart of this revolutionary lead testing system.

## HERE'S HOW IT WORKS

The process starts as soon as the electrode detects the sample. A tiny electric current is passed through the solution. Lead and other ions are deposited onto the electrode surface – just like electroplating.

Once the plating phase is complete, the scanning phase commences. The analyzer applies an increasing reverse potential to the electrode to strip off the deposited metals. Each metal is stripped in a fixed order and at a precisely known potential. In this way, lead and other metals are separated from each other.

The scanning analyzer precisely controls the electrode cycle and captures and correlates thousands of signal readings. The instrument's microprocessor interprets these readings to specifically identify lead and to determine its exact concentration. There are no interferences from the other metals or from non-metallic surfaces such as wood or plaster.

Because the scanning analyzer works simply by passing a tiny electric current through the sample, it is so safe and simple to use. Unlike conventional metal analysis systems for the laboratory, the scanning analyzer does not use X-rays, heat or other high-energy radiation sources.

# SA-5000 SCANNING ANALYZER

## PAINT

A primary application of the SA-5000 Scanning Analyzer is testing for lead in paint. Paint from homes, workplaces and from steel structures such as bridges can be tested. Paint samples are taken by coring, or by scraping from a known surface area, depending on the nature of the substrate. The paint chips are extracted using an EPA Extraction Method or equivalent protocol. The extraction involves treating the paint sample with diluted nitric acid in an ultrasonic bath to release the lead into solution.

The prepared sample is then tested using the scanning analyzer. The result is given in either milligrams/sq cm ( $\text{mg}/\text{cm}^2$ ) or milligrams/sample ( $\text{mg}/\text{sample}$ ). The latter result can be used to calculate the percentage lead in the paint. The test can be applied in either low, high or extended range to meet different practical circumstances on-site.

| PAINT          | RANGE  | DETECTION LIMIT  | RESOLUTION  | CV                           |
|----------------|--|--|---|------------------------------|
| Low Range      | 0.04 – 3.0 $\text{mg}/\text{cm}^2$<br>0.02 – 1.5 $\text{mg}/\text{sample}$ | 0.04 $\text{mg}/\text{cm}^2$<br>0.02 $\text{mg}/\text{sample}$ | 0.01 $\text{mg}/\text{cm}^2$<br>0.005 $\text{mg}/\text{sample}$ | $\leq 7\%$<br>$\leq 7\%$ (a) |
| High Range     | 0.2 – 10 $\text{mg}/\text{cm}^2$<br>0.1 – 5 $\text{mg}/\text{sample}$      | 0.2 $\text{mg}/\text{cm}^2$<br>0.1 $\text{mg}/\text{sample}$   | 0.1 $\text{mg}/\text{cm}^2$<br>0.1 $\text{mg}/\text{sample}$    | $\leq 7\%$<br>$\leq 7\%$ (b) |
| Extended Range | 1 – 50 $\text{mg}/\text{cm}^2$<br>0.5 – 25 $\text{mg}/\text{sample}$       | 1 $\text{mg}/\text{cm}^2$<br>0.5 $\text{mg}/\text{sample}$     | 0.5 $\text{mg}/\text{cm}^2$<br>0.5 $\text{mg}/\text{sample}$    | $\leq 7\%$<br>$\leq 7\%$ (c) |



a) at 0.4  $\text{mg}/\text{cm}^2$  or 0.2  $\text{mg}/\text{sample}$  b) at 1  $\text{mg}/\text{cm}^2$  or 0.5  $\text{mg}/\text{sample}$  c) at 5  $\text{mg}/\text{cm}^2$  or 2.5  $\text{mg}/\text{sample}$

## DUST

Dust particles containing lead, present a potentially serious risk in homes and in workplaces. The SA-5000 Scanning Analyzer provides a simple means of assessing lead in surface dust. Clearance testing for dust can be carried out on-site. A measured area is marked out with masking tape or by using a suitable template. The dust is then sampled using a special sampling wipe. After sampling, the lead is extracted by treating the wipe with diluted nitric acid in an ultrasonic bath.

The prepared sample is then tested using the Scanning Analyzer. The result is given as micrograms/sample ( $\mu\text{g}/\text{sample}$ ). Since the dust is collected over a known area, this result will equate to micrograms/area. For example for a sample collected from a 12" x 12" area, the answer will be in terms of micrograms/sq ft ( $\mu\text{g}/\text{ft}^2$ ). The test can be applied in either regular or extended range to meet different practical circumstances on-site.



| DUST           | RANGE                                  | DETECTION LIMIT                 | RESOLUTION                     | CV   |
|----------------|--|---------------------------------|--------------------------------|--|
| Regular Range  | 25-1500 $\mu\text{g}/\text{sample}$    | 25 $\mu\text{g}/\text{sample}$  | 5 $\mu\text{g}/\text{sample}$  | $\leq 7\%$<br>(at 200 $\mu\text{g}/\text{sample}$ )  |
| Extended Range | 125 – 7500 $\mu\text{g}/\text{sample}$ | 125 $\mu\text{g}/\text{sample}$ | 25 $\mu\text{g}/\text{sample}$ | $\leq 7\%$<br>(at 1000 $\mu\text{g}/\text{sample}$ ) |

Palintest dust sampling wipes may be used for any approved EPA, AIHA or ASTM sampling procedure. The lead in dust test can also be used with other sampling protocols such as vacuum dust collection.

## AIR

Lead in airborne dust is a serious health risk particularly for lead abatement workers and for workers in industry. The SA-5000 Scanning Analyzer is ideal for assessing lead in airborne dust in order to meet OSHA worker protection regulations or other worker legislation. To monitor airborne dust, a personal air sampler with a standard 37 mm sampling disc is worn by the user for a set period of time. The disc from the sampler is treated with dilute nitric acid in an ultrasonic cleaning bath to release any lead into solution.

The prepared sample is then tested using the Scanning Analyzer. A reading of the lead in dust concentration in terms of micrograms/sample ( $\mu\text{g}/\text{sample}$ ) is obtained. The test results are normally converted to an 8-hour exposure value in accordance with standard OSHA protocol. The test can be used in either regular or extended range to meet different practical conditions in sampling.

| AIR           | RANGE                                | DETECTION LIMIT                | RESOLUTION                    | CV   |
|---------------|--------------------------------------|--------------------------------|-------------------------------|--|
| Regular Range | 10 – 600 $\mu\text{g}/\text{sample}$ | 10 $\mu\text{g}/\text{sample}$ | 2 $\mu\text{g}/\text{sample}$ | $\leq 7\%$<br>(at 80 $\mu\text{g}/\text{sample}$ ) |



## SOIL

Soil contamination can occur through a variety of sources such as the past disposal of lead-containing materials, run-off from streets and freeways or from general pollution. The SA-5000 Scanning Analyzer provides a reliable means of testing for lead contamination of soil. Soil is collected by taking scoops of the soil particles from different places over the sampling area. An ASTM or similar protocol should be used for taking the soil sample. The collected sample is mixed and allowed to dry. A known weight of soil is extracted with diluted nitric acid in an ultrasonic cleaning bath to release the lead into solution. For a quick screening, test undried soil of known volume can be taken.

The prepared sample is then tested using the Scanning Analyzer. The result of the test is expressed in terms of micrograms/sample ( $\mu\text{g}/\text{sample}$ ). This reading can be converted by a simple calculation to milligrams per kilogram or parts per million – the units in which soil is most often reported.

The lead in soil test can be applied in either regular or extended range to meet different site conditions.



| SOIL           | RANGE   | DETECTION LIMIT                 | RESOLUTION                     | CV  |
|----------------|---|---------------------------------|--------------------------------|---|
| Regular Range  | 25-1500 $\mu\text{g}/\text{sample}$<br>(50 – 3000 mg/kg (ppm))*       | 25 $\mu\text{g}/\text{sample}$  | 5 $\mu\text{g}/\text{sample}$  | $\leq 7\%$<br>(at 200 $\mu\text{g}/\text{sample}$ ) |
| Extended Range | 125 – 7500 $\mu\text{g}/\text{sample}$<br>(250 – 15,000 mg/kg (ppm))* | 125 $\mu\text{g}/\text{sample}$ | 25 $\mu\text{g}/\text{sample}$ | $\leq 7\%$<br>(at 200 $\mu\text{g}/\text{sample}$ ) |

\*For a 500 mg Soil Sample

## WATER

Lead contamination in water usually occurs from old lead piping or from the use of lead-based solder in household pipe work. Lead also enters the aquatic environment through lead dust fallout, leaching in soil, urban run-off and waste discharges. Agencies such as the EPA, and international bodies such as the World Health Organisation, now apply stringent limits to the permissible amount of lead in drinking water. The SA-5000 Scanning Analyzer provides a simple, rapid means of determining lead in drinking water samples.

For fresh collected samples, the test can be carried out directly on the water sample. Stored samples are acidified with nitric acid to solubilise the lead. Some testing protocols may require acidification of the water sample as standard.

The Scanning Analyzer gives a direct reading of the lead in water concentration in terms of micrograms/litre ( $\mu\text{g}/\text{l}$ ). This is numerically the same as parts per billion (ppb).

| WATER         | RANGE                                | DETECTION LIMIT                | RESOLUTION                     | CV                        |
|---------------|--------------------------------------|--------------------------------|--------------------------------|---------------------------|
| Regular Range | 2 – 100 $\mu\text{g}/\text{l}$ (ppb) | 2 $\mu\text{g}/\text{l}$ (ppb) | 1 $\mu\text{g}/\text{l}$ (ppb) | $\leq 7\%$<br>(at 15 ppb) |



*For professionals concerned with lead in water testing, a water specific Scanning Analyzer is available.*

*The model SA-1000 Scanning Analyzer has the same range and detection limit for lead in water as the model SA-5000 but has the additional facility of testing for copper at the same time. The instrument is particularly suited to applying the lead-copper rule. Please contact us for a separate SA-1000 leaflet.*

## USING THE SCANNING ANALYZER

The Palintest Model SA-5000 Scanning Analyzer is so simple to use. Firstly select the required test program – paint, dust, air, soil or water and range. The Scanning Analyzer then calls for the operator to enter or confirm the electrode pack calibration code. This code is specific for each combination of electrodes and conditioning tablets. The use of a specific calibration code ensures the optimum precision and accuracy for the system.



To carry out the test, a portion of the prepared test sample is transferred to a small tube and a SoluPrep conditioning tablet added. This tablet provides the correct electrical conductivity in the test sample. An electrode is then inserted into the electrode holder and immersed in the sample. The Scanning Analyzer does the rest.

In the case of paint, dust, air or soil samples, the instrument displays the result in 45 seconds. For water samples, because of the enhanced sensitivity for drinking water testing, the result will appear in 3 minutes.

The used electrode is ejected into the sample tube. The tube is capped and then disposed of with normal waste. The system is simple, precise and economical.

## SA-5000 SCANNING ANALYZER

The Palintest SA-5000 Scanning Analyzer is a portable, lightweight instrument equally suitable for use on-site or in the laboratory. The instrument features solid-state digital electronics and is designed to give long and trouble-free operation. The user interface is a simple menu-driven display which guides the operator through each stage of operation with easy to understand messages.

The instrument provides a wide range of user-selectable options such as choice of display language, date format, project number and sample number entry. Sample numbers cannot be duplicated. All test results are time and date stamped by the built-in clock.

Test results are stored in memory and can be recalled to the instrument display or downloaded to a computer or printer. Each download of data starts with the instrument's unique serial number.

This feature, together with the project number and sample number options, ensure complete traceability of all test data.

The Scanning Analyzer operates off standard AA cells. A power management system with auto-switch off ensures long battery life. Scanning Analyzer outfits are supplied with full operating instructions and test protocols for sampling and lead analysis.

## PRODUCT ORDERING INFORMATION

- PT 470** SA-5000 Scanning Analyzer Paint / Dust / Air / Soil / Water Outfit  
Includes SA-5000 Scanning Analyzer Instrument, electrode holder and sample holder, Ultrasonicator, 1ml and 5 ml pipettors, paint coring tool, soil sampling scoop and test tube rack. Supplied in carrying case. Does not include electrodes (See electrodes and consumables below).
- PT 471** SA-5000 Scanning Analyzer Standard Kit.  
Includes SA-5000 Scanning Analyzer instrument with electrode holder and sample holder in small carrying case with space for electrode pack only. Does not include electrodes.

## ELECTRODES AND CONSUMABLES

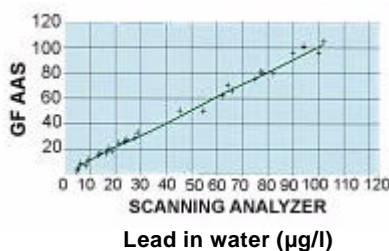
- PT 474** Paint Sample Preparation and Electrode Pack  
**PT 475** Dust Sample Preparation and Electrode Pack  
**PT 476** Soil Sample Preparation and Electrode Pack  
**PT 478** Water Electrode Pack  
**PT 479** Paint, Dust and Soil Electrode Pack

Sample preparation and electrode packs contain sampling consumables, sonicator tubes and an electrode pack for 10 tests. Electrode packs contain electrodes, SoluPrep tablets and sample tubes.

## ACCURACY AND SENSITIVITY

The Palintest Scanning Analyzer is designed to give results which are comparable with analysis by graphite furnace atomic absorption spectroscopy (GF-AAS). The sensitivity of the instrument and electrode system meets or exceeds that required for the application of the commonly applied environmental standards for lead.

### Comparative Study Comparing Scanning Analyzer - v - GF-AAS for Water Samples



The performance of the Scanning Analyzer system has been established by an extensive program of testing. Tests carried out by Palintest, Palintest distributors and independent testing laboratories compared Scanning Analyzer results from real and spiked samples against results obtained by standard laboratory analytical methods. Both ELPAT proficient and NLLAP accredited laboratories in mobile and fixed-site settings have been used in assessing the Scanning Analyzer system. Test studies have shown statistically valid correlation between the results obtained with the Palintest Scanning Analyzer and those obtained by GF-AAS. Detailed results of evaluation studies are available on request.

## TECHNICAL SPECIFICATIONS

### SA-5000 INSTRUMENT

- INSTRUMENT TYPE:** Scanning Analyzer dedicated to lead determination in paint, dust, air, soil and water.
- DISPLAY:** Intelligent 2 x 16 character alphanumeric display. Test identification and prompts in English, French and Spanish. Direct reading of test results in µg/l, mg/cmf µg/sample and mg/sample.
- USER-SELECTABLE OPTIONS:** Time and date set, date format, display language and sample number entry.
- INTERNAL MEMORY:** Stores 300 test results
- DATA RECALL:** Recall of previous test results to display
- OUTPUT INTERFACE:** Output to printer or computer via RS 232 interface
- ELECTRODE CONNECTOR:** Connector cap with electrode ejector button. Connector cap receives electrode and connects to instrument through screened cable and jack-plug. Freestanding holder for sample tube.
- SIZE:** Instrument only 6" x 5" x 2" (170 x 130 x 55 mm)
- WEIGHT:** 375 g

### SE1 ELECTRODES

- ELECTRODE TYPE:** Disposable single-use electrode. Multilayer solid-state construction.
- PRINCIPLE OF OPERATION:** Differential pulse anodic stripping voltammetry.
- APPLICABLE ELECTRODES:** Type SE-1 PDS calibrated for lead in paint, dust and soil.  
Type SE-1 LW calibrated for lead in water  
Type SE-1W calibrated for lead and copper in water. (Note copper cannot be measured on Model SA-5000 Scanning Analyzer).
- SPECIFICITY:** Specific for lead (and copper where applicable). Do not respond to other metals. Free of interference from commonly occurring constituents in samples and substrates.
- SAMPLE PREPARATION:** According to standard protocol. Condition prepared sample with Palintest SoluPrep tablets.
- PACKAGING:** Electrodes and SoluPrep tablets individually packed in aluminium foil strip. Packs endorsed with a specific calibration code.
- SHELF-LIFE:** One year
- STORAGE TEMPERATURE:** 40 – 85° F (5 - 30° C)