

Energy Dispersive X-ray Fluorescence Spectrometer for RoHS/ELV Screening

EDX-LE



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EDX-LE

Light and Easy, destined to be the Leading Expert for screening

Making the Difficult Simple

- The [Screening Analysis] window makes operation easy
- Fully automatic, from determining main components to selecting conditions
- Simple screening setting functions can be easily changed according to the control system on user side

Fully Equipped with Essential Functions

- RoHS/ELV analysis functions are standard
- Large Sample Chamber enables as-is measurement of large samples
- Protection functions restrict changing conditions or data



Comparison of Applicability of EDX-LE for Screening Applications

Regulation											
Element	Cl	Br	Hg	Cr	Pb	Cd	Sb	As	Ba	Se	Ni
EDX-LE	○	◎	◎	◎	◎	◎	○	○*	○*	○*	△*

◎: Standard applicability

○: Optional applicability

△: Applicability depends on analytical conditions

*Additional function kit is required.

Making the Difficult Simple

Easy Screening, Even for First-time Users

Start sample measurement from [Screening Analysis] using simple steps. The selection of measurement conditions, which typically relies on the judgment of the experimenter, is determined automatically. This means that even first-time users can rest assured.

1st Step

Simply set the sample and click [START].



Place the Sample

- After placement, the sample observation camera observes the sample and confirms the sample's analysis position.
- Set the analysis area to 3 mm, 5 mm, or 10 mm diameter.
- Close the sample chamber.



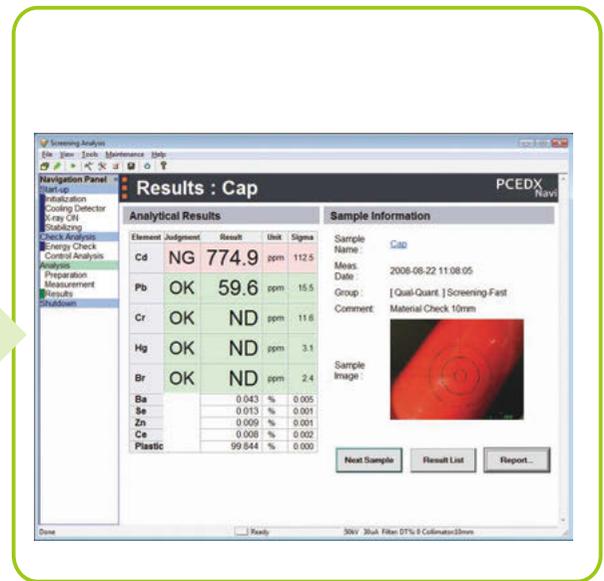
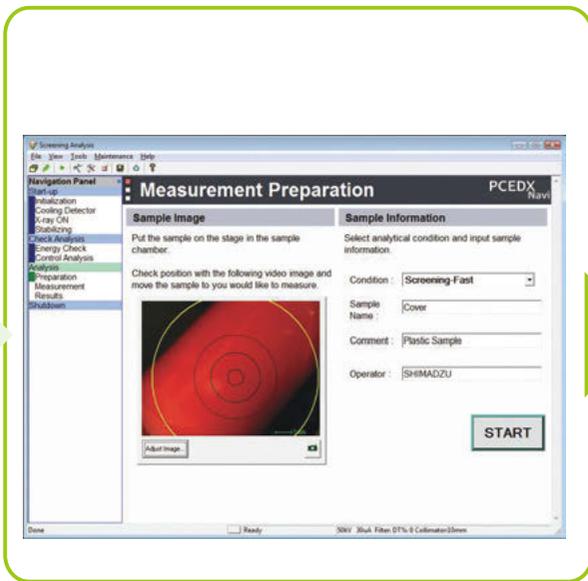
To check the results to date...

Results List: Lists data of completed measurements (with photographs)

Case	Material	OK	NG	PK	OK	NG	PK	OK	NG	PK	OK	NG	PK
2008-02-18-01-12	Ca	ND	ND	OK	PK	ND	ND	OK	PK	ND	ND	OK	PK
		(20.0) ppm				(20.0) ppm				(12.4) ppm			
										(5.5) ppm			
										(14.9) ppm			
2008-02-18-01-41	Ca	717.9	ND	NG	PK	ND	ND	OK	PK	ND	ND	OK	PK
		(106.9) ppm				(11.0) ppm				(2.2) ppm			
2008-02-18-04-01	Ca	ND	ND	OK	PK	29043.4	ND	OK	PK	1983.7	ND	OK	PK
		(20.0) ppm				(1426.1) ppm				(182.0) ppm			
										(18.5) ppm			
										(18.7) ppm			

2nd Step

3rd Step



Select Analysis Conditions/ Enter Sample Name

- The [Measurement Preparation] window displays the current sample image. Use this window to select analysis conditions and enter a sample name.
- Start measurement with a single click.

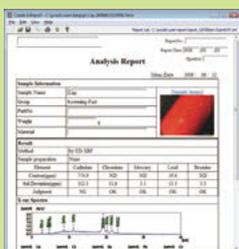
Display of Analysis Results

- After measurements are completed, [Pass/Fail Judgment], [Concentration], and [3σ (Measurement Variance)] are displayed for all 5 elements in an easy-to-understand layout.
- Display the [Result List] and [Individual Report] with a single mouse click.



If you want to create a report...

Individual Report: Displays a report of the current sample

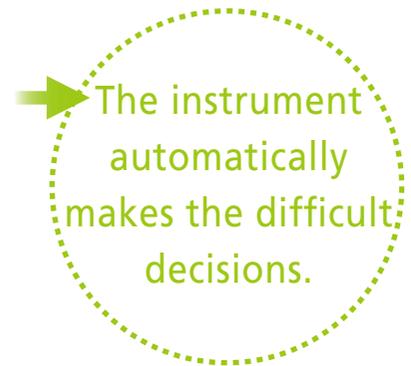


Create reports in Excel or HTML format. Reports can also be created for non-RoHS 5 element data.

*Note that this requires installation of Microsoft Office Excel before use.

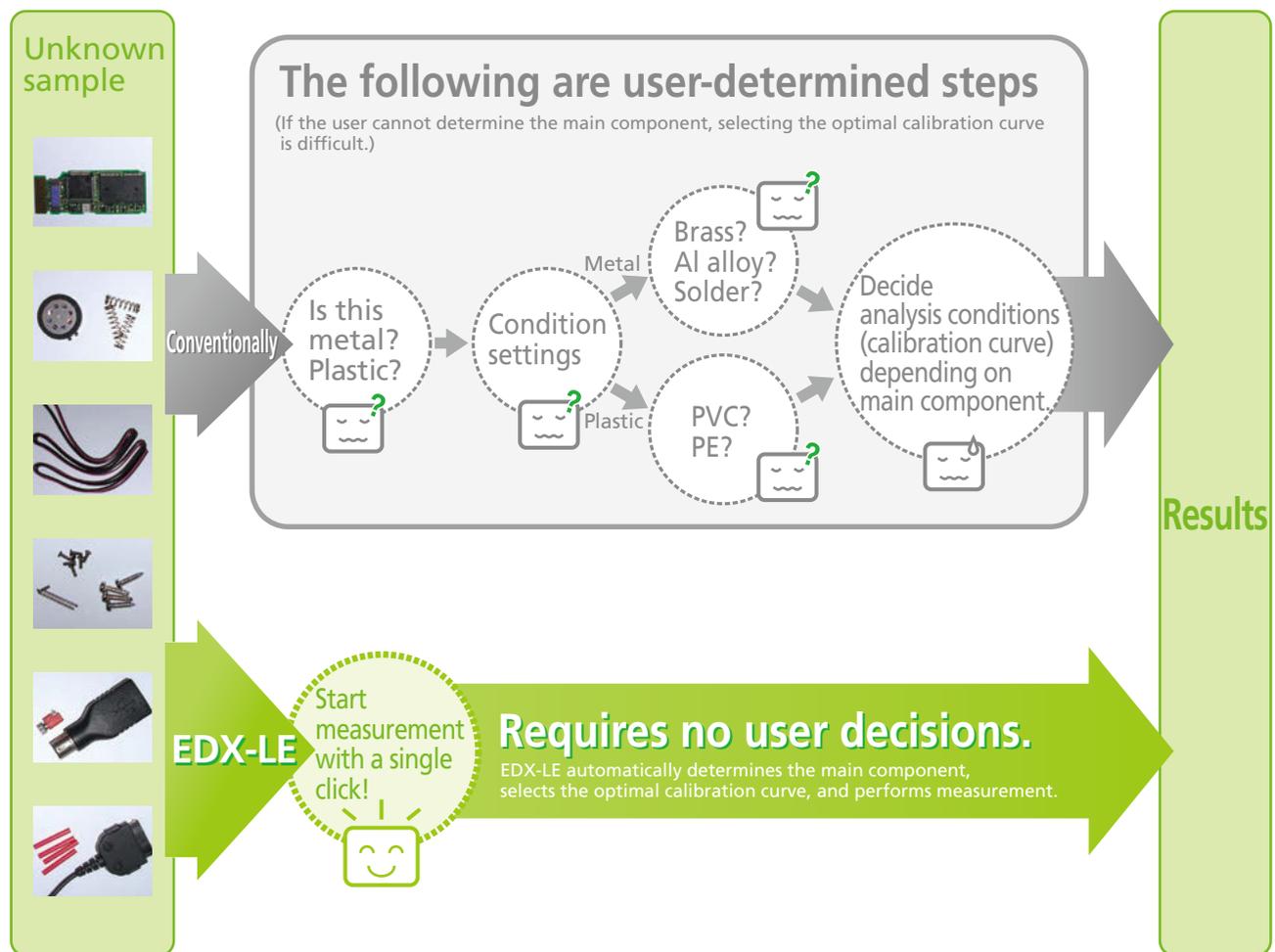
Screening Software Features

A single click in the [Screening Analysis] window automatically performs everything from measurement to the display of results, in accordance with your pre-registered analysis conditions.



All steps, from judgment of the main components to the selection of conditions, are automated

Automatic Calibration Curve Selection Function



Variety of functions makes screening easier

Simple Screening Setup

Screening conditions can be customized easily according to the control system.

Changing Threshold Values

Threshold values can be set for each material or element. The screening judgment method can also be changed in accordance with the input method used for threshold values. Furthermore, lower limits for threshold values can be referenced for each material, which helps to set threshold values.

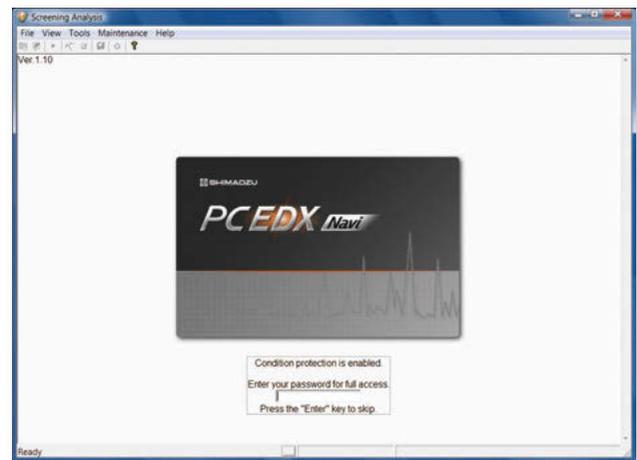
Element	Settings of Threshold(ppm)				
	Plastic	Al	Fe	Cu	Sn
Cd	35-65	35-65	35-65	35-65	350-650
Pb	70-130	70-130	210-390	210-390	210-390
Cr	70-130	70-130	210-390	210-390	210-390
Hg	70-130	70-130	210-390	210-390	210-390
Br	70-130	70-130	210-390	210-390	210-390

Meas. Condition	Precise filter	Time Reduction
Estimated Time	6 minutes	6 minutes 16 minutes 16 minutes 16 minutes

EDX-LE Offers Improved Security for Software Operations

Condition Protection Function

Restrictions can be specified for screening conditions and various other settings.



Changing Judgment Character Strings

The character strings displayed for judgments in analysis results, used to indicate whether they are below the threshold value, in the gray zone, or above the threshold value, can be specified.

Changing the Report Template

The style used for reports can be changed. The standard templates provided can be selected.

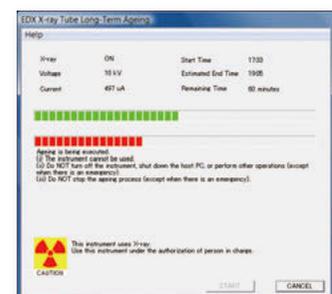
Variety of functions minimizes instrument maintenance requirements

Automatic X-ray Tube Ageing Function

If the instrument has not been used for a long time, the X-ray tube must be aged when it is restarted. To prevent malfunction, this process has been automated.

Detector Does Not Require Liquid Nitrogen

The EDX-LE is equipped with a detector that does not need to be cooled with liquid nitrogen, providing significantly reduced operating costs.



Fully Equipped with Essential Functions

All-in-One Design Includes All Functions Required for RoHS/ELV Screening

Overall RoHS/ELV analysis performance is tied to the smooth coordination of a variety of analytical systems, creating a synergistic effect.

For this reason, EDX-LE standard equipment includes all the functions required for RoHS/ELV analysis, providing users with the optimal RoHS/ELV screening System.

Obtaining highly reliable analytical results

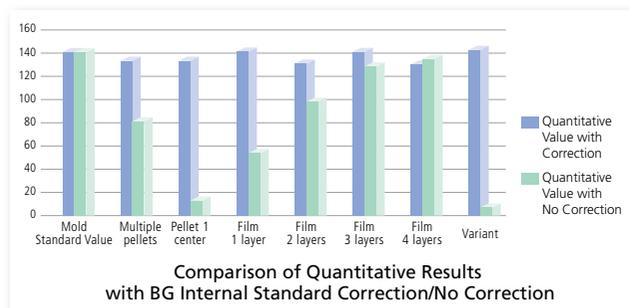
Calibration Curve Method and FP Method

To improve the reliability of analysis results for elements specified by the RoHS/ELV directive, the elements are analyzed using the calibration curve method and standard sample (check sample) provided with the instrument. (The Fundamental Parameter (FP) method is used to analyze some RoHS elements in metal samples.) Any other elements detected are analyzed using the FP method, which uses theoretical calculations to provide additional information.

Compensates for the influence of differences in shape of actual samples on analysis results

Shape Correction Function

X-ray intensity differs with the shape and thickness of samples, even if they contain the same material, and will have an impact on quantitative values. EDX-LE utilizes a BG internal standard method* to eliminate the effect of shape and thickness in order to provide highly precise results.



* BG internal standards method:
Fluorescent X-ray intensity of each element is standardized using scattered X-ray intensity.

Large Sample Chamber

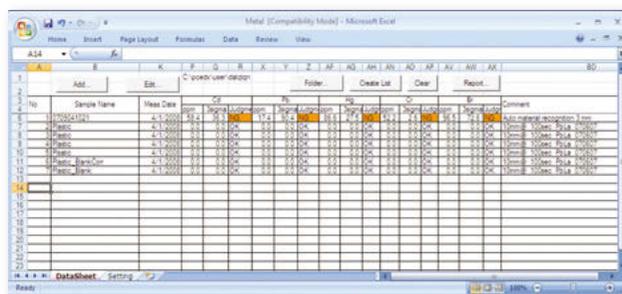
Despite its compact body, the EDX can accommodate samples up to W370 mm × D320 mm × H155 mm.



Organize measurement results in a list

List Creation Function

List data stored in Excel format.

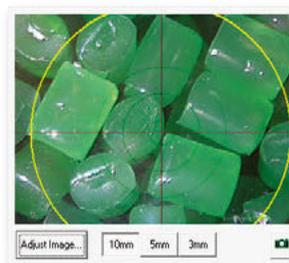


Note that this requires installation of Microsoft Office Excel before use.

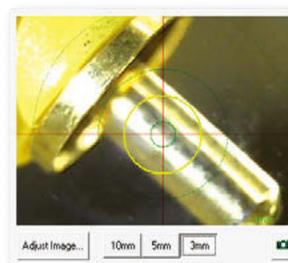
Accommodates a Variety of Samples

Sample Observation Function

When measuring foreign substances and samples with multiple parts, the sample observation camera allows the analysis position to be easily specified by checking the camera image. If the sample is small or if specific locations on the sample are being measured, the collimator can be used to change the X-ray exposure region.



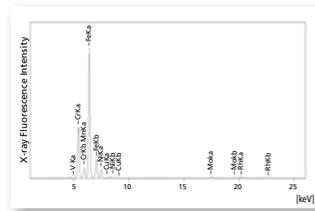
10 mm dia. image (plastic)



3 mm dia. image (metal)

Qualitative-Quantitative Analysis *Additional function kit is required.

The EDX-LE can perform qualitative analysis and non-standard quantitative analysis based on the FP method. This means it can be used to analyze foreign substances or differentiate between different materials.



Qualitative Profile of Stainless Steel

Analyte	Result	[Signal]	Proc. Calc.	Line
Fe	71.448	%	(0.245) Quant.-FP	FeK α
Cr	18.810	%	(0.105) Quant.-FP	CrK α
Mn	7.462	%	(0.105) Quant.-FP	MnK α
Si	1.446	%	(0.054) Quant.-FP	SiK α
Cu	0.339	%	(0.032) Quant.-FP	CuK α
S	0.242	%	(0.029) Quant.-FP	SK α
Y	0.083	%	(0.014) Quant.-FP	Y K α

Quantitative Analysis Results for Stainless Steel (FP Method)

Matching (Steel Type Identification, Product Identification) *Additional function kit is required.

Comparing measurement data to a data library of steel types allows automatic identification for everything from materials closest to the sample, to the 10th position on the library list. In addition to matching by intensity, matching by content is also available if the user creates and registers libraries of concentrations and elements.

Candidate	Dif. Factor
SUS_304N2	0.82107
SUS_304L	0.82823
SUS_304	0.86544
SUS_321	0.87971
SUS_304LN	0.74885
SUS_347	0.82780
SUS_305	0.85301
SUS_303	0.93634
SUS_303S	0.95500
SUS_302	1.07375

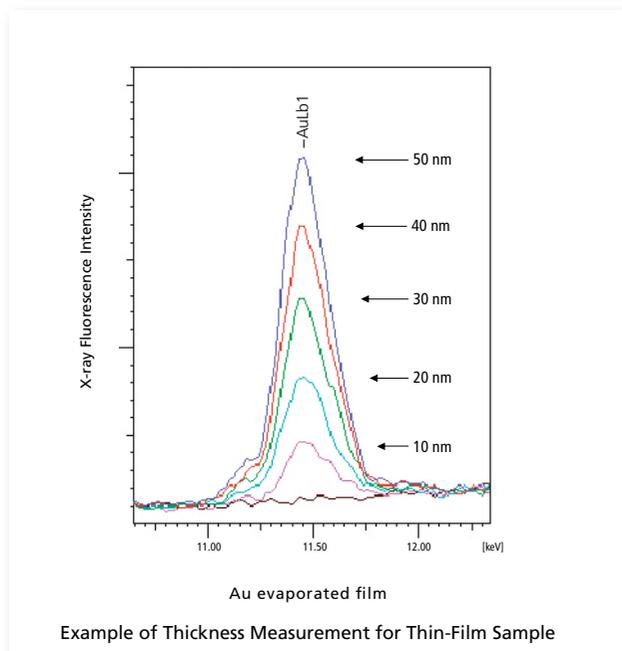
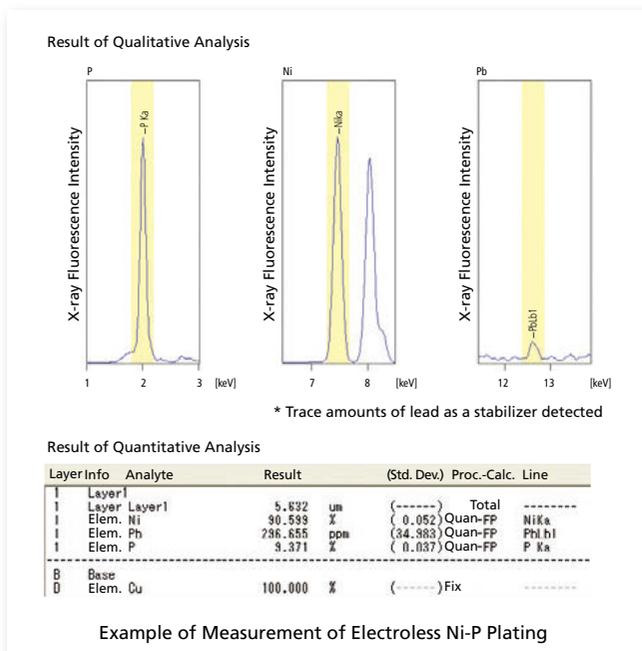
Intensity Matching Results

View	Element	Concentration	Element	Concentration
1	Fe	71.448	Fe	71.448
2	Cr	18.810	Cr	18.810
3	Mn	7.462	Mn	7.462
4	Si	1.446	Si	1.446
5	Cu	0.339	Cu	0.339
6	S	0.242	S	0.242
7	Y	0.083	Y	0.083
8				
9				
10				

Element and Content Registration Window

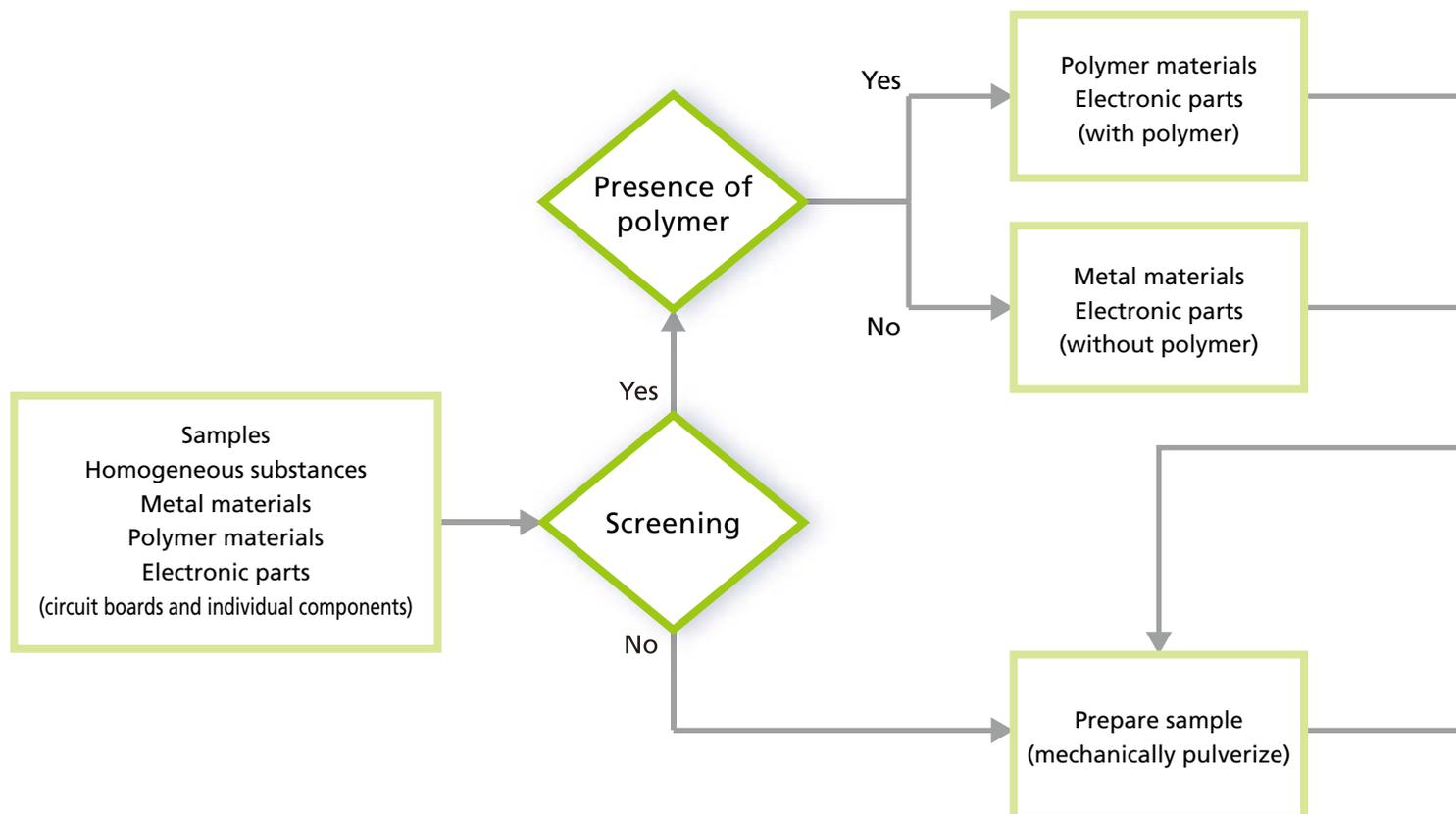
Thin-Film Analysis *Additional function kit is required.

The Film FP method obtains not only single layer, but multilayer film thickness, composition, and deposit volume. It is also well-suited to the measurement of Pb contained in plating. (Information on the layer order (including base) and the constituent elements is necessary.)



Screening Method Proposed by Shimadzu for Revised RoHS Directive

Shimadzu offers customers comprehensive assistance with establishing capabilities for complying with RoHS/ELV requirements. In addition to developing and manufacturing energy dispersive X-ray fluorescence spectrometers (EDXRF), which account for a major share of testing equipment used for RoHS/ELV directive compliance, Shimadzu also develops and manufactures ICP atomic emission spectrometers (ICP-AES), ICP mass spectrometers (ICP-MS), atomic absorption spectrophotometers (AA), ultraviolet-visible spectrophotometers (UV-VIS), Fourier transform infrared spectrophotometers (FT-IR), gas chromatograph mass spectrometers (GC/MS), high performance liquid chromatographs (HPLC), and ion chromatographs (IC), develops applications, and even offers guidance for testing methods.



Substances Restricted by RoHS II and Start Date

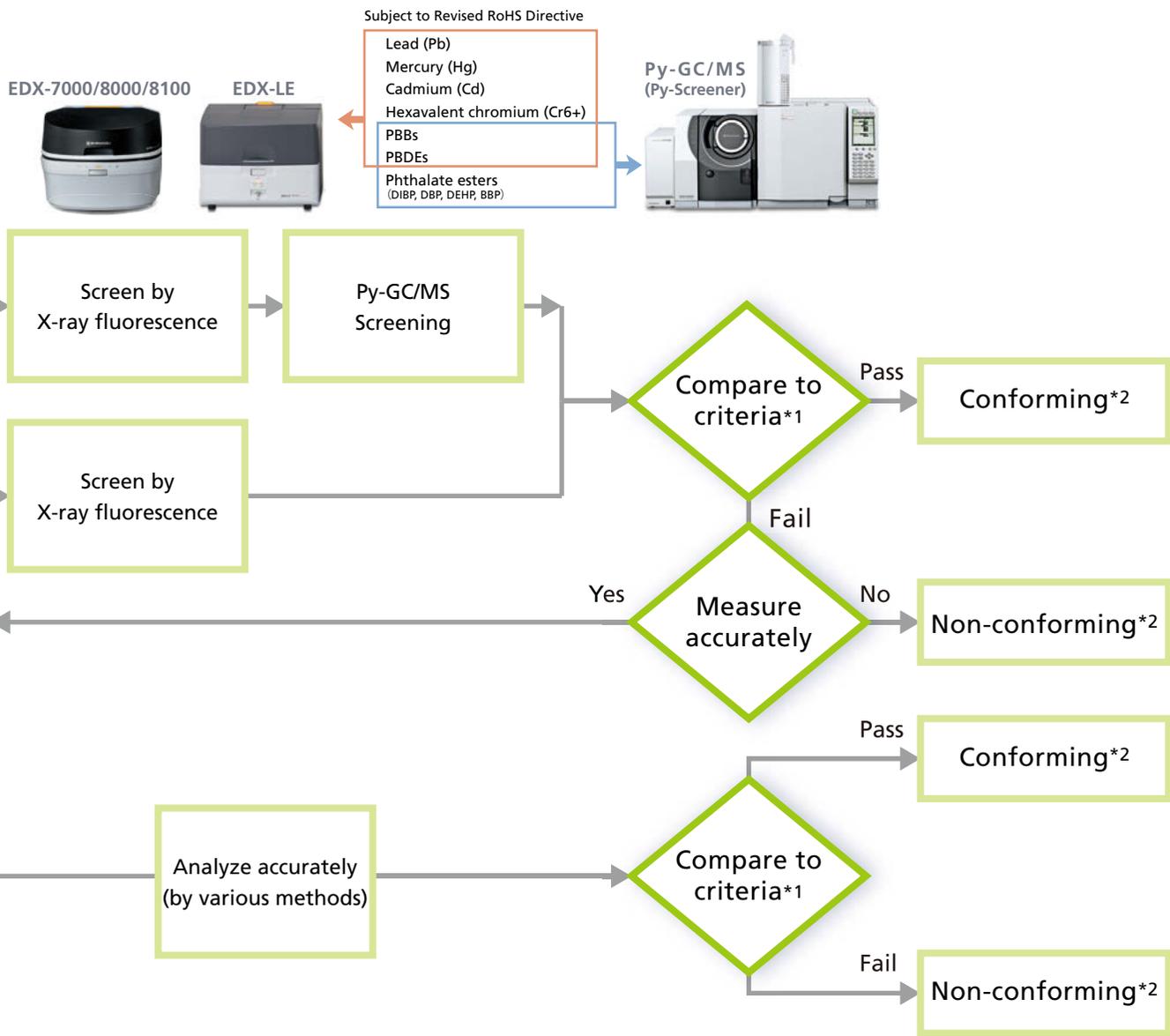
Restricted Substances	Max. Allowable Conc.	Date of Applicability (Categories 1 to 7 and 10)	Date of Applicability (Categories 8 and 9)	Date of Applicability (Category 11)
Lead	0.1%	July 01, 2006	July 22, 2014 In vitro diagnostic medical devices: July 22, 2016 Industrial monitoring and control instruments: July 22, 2017	July 22, 2019
Mercury	0.1%			
Cadmium	0.01%			
Hexavalent chromium	0.1%			
Brominated flame retardants	PBB	July 22, 2019	July 22, 2021	
	PBDE			
Phthalate esters	DEHP			
	BBP			
	DBP			
	DIBP			

Categories

1: Large household appliances, 2: Small household appliances, 3: IT and telecommunications equipment, 4: Consumer equipment,

5: Lighting equipment, 6: Electrical and electronic tools, 7: Toys, leisure and sports equipment, 8: Medical devices,

9: Monitoring and control instruments including industrial monitoring and control instruments, 10: Automatic dispensers, and 11: Other electrical and electronic equipment



AA-7000 Series



ICPE-9800 Series



ICPMS-2030



UVmini-1280



GCMS-QP2020



IRAffinity-15



Prominence HIC-NS/HIC-SP



*1: Pass/fail criteria are determined by respective institutions.

*2: Conforming and non-conforming refer to conformance/non-conformance with criteria of institution.

RoHS Compliance Screening Analysis Instruments

Energy Dispersive X-ray Fluorescence Spectrometer

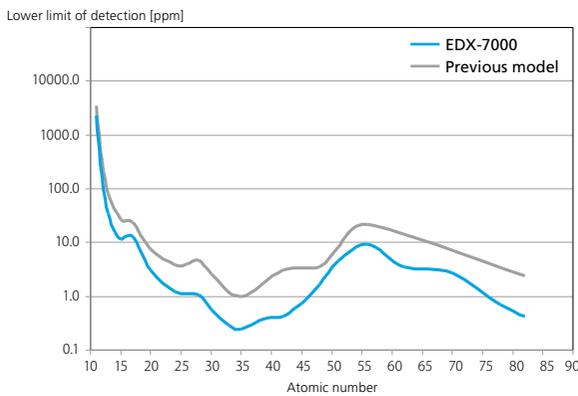
EDX-7000/8000/8100

- High Sensitivity, High Speed, and High Resolution**
 High speed, high sensitivity, and high resolution SDD detector and optimized hardware achieve the highest level of analysis performance in its series.
- Accommodates Various Types and Sizes of Samples**
 EDX-7000/8000/8100:
 The combination of Small Spot Analysis Kit and EDXIR-Analysis Software facilitate the contaminant analysis. Turret for 12 samples permits continuous measurement.
 EDX-7000/8100:
 Vacuum Measurement Unit (also accommodates EDX-8000) and Helium Purge Unit enable the analysis of liquid, powder and solid samples.
 EDX-8000/8100:
 The wide-range detector permits the range of detected elements from C to U.
- Easy Operation**
 PCEDX-Navi software allows easy operation for RoHS directive restricted material analysis and report creation even for beginners.

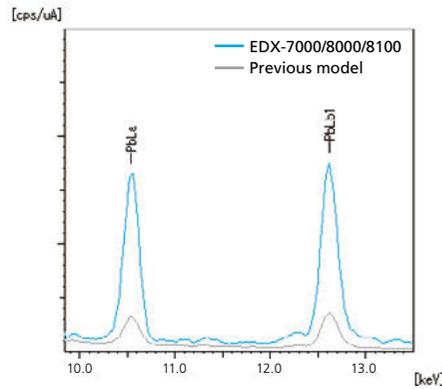


High Sensitivity – Lower Limit of Detection Improved 1.5 to 5 Times! –

The high-performance SDD detector and combination of optimized optics and primary filters achieve previously unheard-of high levels of sensitivity. The sensitivity is higher than the previous Si (Li) semiconductor detector across the entire range from light to heavy elements.



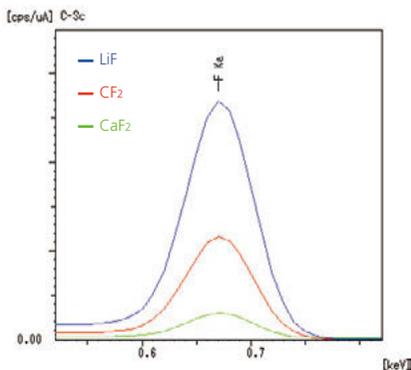
Comparison of the Lower Limit of Detection in a Light Element Matrix



Profile Comparison for Lead (Pb) in Copper Alloy

Ultra-Light Element Analysis by EDX-8000/8100

The EDX-8000/8100 features an SDD detector with a special ultra-thin-film window material that is able to detect ultra-light elements such as carbon (C), oxygen (O), and fluorine (F)



Profile of Fluorine (F) by EDX-8000

Screening System for Phthalate Esters Py-Screener

Making the Difficult Simple

The Py-Screener system is designed to screen for phthalate esters in polymers. The use of phthalate esters in toys and food packaging is currently restricted. Moving forward, they are expected to be regulated as restricted substances under the RoHS (II) Directive. The Py-Screener system consists of special software, special standard samples, and a sampling toolkit, which supports the entire process from sample preparation to data acquisition, data analysis, and maintenance. It provides an environment in which operations are simple, even for novices.



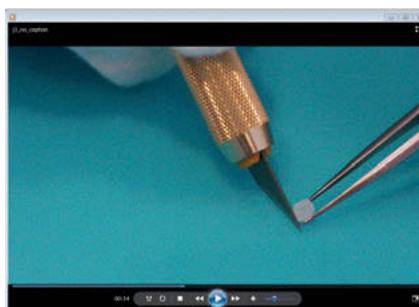
Feature

Organics Solvents Are Not Required for Sample Preparation

Analytical standards and test samples can be prepared without using organic solvents. To prepare a sample, just use the cutter to remove a portion from the test material, place it in the sample cup, and weigh it. Sample preparation videos provide support so that even novices can easily prepare samples.



Preparation of a Phthalate Ester Standard



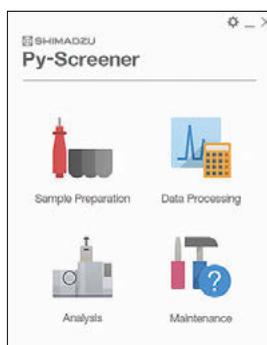
Preparation of a Test Sample

Sample Preparation Videos

Sample preparation videos: <http://www.shimadzu.com/an/gcms/py-screener.html>

Easy to Operate Using Special Software

The special software leads you through the required procedures, so even novices can perform the operations in accordance with the software instructions. The Py and GC-MS analysis conditions are preset. To automatically start continuous analyses, just place the prepared standard samples and test samples in the autosampler, and enter the number of samples, the sample names, and their weights. Continuous measurements can be performed overnight, so approximately 30 samples can be measured per day.



Special Py-Screener Software

	Vial#	Sample Name	Sample Amt.
1	1	Blank_Cup	0.5
2	2	Phthalate_STD_Blank	0.51
3	3	Phthalate_STD_100	0.51
4	4	Phthalate_STD_1000	0.51
5	5	ERM-EC691	0.51
6	6	Test_Sample	0.51
7	7	Test_Sample	0.51
8	8	Test_Sample	0.51
9	9	Test_Sample	0.51
10	10	Test_Sample	0.51
11	11	Test_Sample	0.51

Measurement Schedule Window

Instrument Specifications

Primary Specifications

Measurement Principle	X-ray fluorescence spectrometry
Measurement Method	Energy dispersive
Measurement Sample Type	Solids, liquids, or powder
Elements to be Detected	^{13}Al to ^{92}U
Sample Chamber Size	Max. W 370 mm x D 320 mm x H 155 mm

X-Ray Generator

X-Ray Tube	Rh target
Tube Voltage	5 kV to 50 kV
Tube Current	1 μA to 1,000 μA
Cooling Method	Air cooling (with fan)
Exposure Area	Automatic switching between 3, 5, and 10 mm dia. areas (1 mm ϕ is an option)
Primary Filter	Automatic switching between: 5 types + OPEN

Detector

Type	Si-PIN semiconductor detector
LN ₂ Supply	Not required
Counting Method	Digital filter counting

Sample Chamber

Measurement Atmosphere	Air
Sample Observation	CCD camera

Data Processing Unit

Memory	1 GB min.
HDD	80 GB min.
Resolution	1024 x 768 pixels min.
Printer	Color inkjet printer
CD	CD-ROM drive
OS	Windows 7*

* Microsoft Office is not included in this OS.

Software

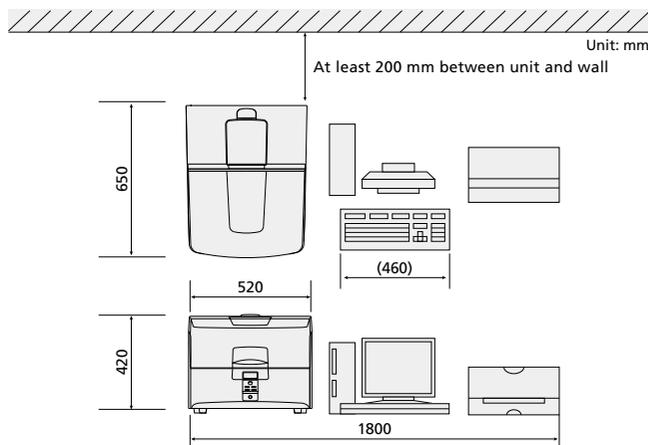
Screening Analysis	Simple operation software
Qualitative Analysis	Measurement/analysis software
Quantitative Analysis	Calibration curve method FP method Thin-film FP method (Option) BG-FP method (Option)
Matching Software	Option
Utilities	Automatic calibration functions (energy calibration, full-width half-maximum calibration)
Other Functions	System-status Monitoring Function Analysis-results Tabulation Function Analysis-results Report Creation Function

Installation Requirements

	Guaranteed Performance	Guaranteed Operation
Temperature	10°C to 30°C (fluctuations should be 2°C/hour max.)	5°C to 35°C
Humidity	40% to 70% (No condensation)	40% to 70% (No condensation)
Power Source	AC 100 V to 240 V \pm 10% 50/60 Hz, 150 VA grounded outlet Power for peripheral devices (printer, PC, display monitor, etc.) must be provided separately.	

Installation Example

Dimensions of the Main Unit	W 520 mm x D 650 mm x H 420 mm
Main Unit Weight	Approx. 60 kg



Options

Halogen Screening Analysis Kit

P/N 212-24908-91

This kit includes an instruction manual for Halogen analysis and a check sample required for measurement of 6 elements (Cd, Pb, Hg, Cr, Br, and Cl) specified by the RoHS directive and Halogen regulation.

RoHS, Halogen, and Antimony Screening Analysis Kit

P/N 212-24922-91

This kit includes an instruction manual and a check sample required for measurement of 7 elements including those specified by the RoHS directive, Halogen regulation, and Antimony (Cd, Pb, Hg, Cr, Br, Cl, and Sb)

Small Spot Solder Analysis Kit

P/N 212-24850-41

This kit includes an instruction manual for small spot solder analysis and a small spot collimator plate required for measurement of a print circuit board.

Additional Function Kit for EDX-LE

P/N 212-24714-42

Adds a general-analysis function to the EDX-LE. For details, please contact your Shimadzu representative.

Sample Cells

3571 General Open-End X-Cell (no lid)

P/N 219-85000-55 (100 pcs/set)

(Outer diameter: 31.6 mm, volume 10 mL)

Polyethylene sample cell used for liquid and powder samples. Used with Mylar or polypropylene films.



3529 General X-Cell (with lid)

P/N 219-85000-52 (100 pcs/set)

(Outer diameter: 32 mm, volume 8 mL)

Used for liquid samples. Equipped with relief hole and liquid retainer in case of liquid expansion.



3577 Micro X-Cell

P/N 219-85000-54 (100 pcs/set)

(Outer diameter 31.6 mm, volume 0.5 mL)

For trace samples. Use with a collimator is recommended to reduce scattered radiation emitted by sample cell.



3561 Universal X-Cell

P/N 219-85000-53 (100 pcs/set)

(Outer diameter 31.6 mm, volume 8 mL)

For liquid and thin-film samples. Equipped with a relief hole and liquid retainer in case of liquid expansion. Equipped with a ring for tightly holding thin-film samples with film.



Polypropylene Film

P/N 219-82019-05 (73 mm W x 92 m roll)

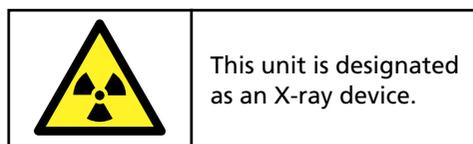
Sample-holding film. (For light element analysis)

Mylar Film

P/N 202-86501-56 (500 sheets/set)

Sample-holding film. (For heavy element analysis)





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