

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

EDX-LE Plus



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

EDX-LE™ Plus

Light and Simple, destined to be the leading expert for screening

Making the Difficult Simple

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

Fully Equipped with Essential Functions

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

Analysis Conditions for RoHS/ELV Elements Included As Standard

- Includes analytical conditions for measuring cadmium, lead, mercury, chromium, and bromine (with built-in calibration curves).
- The included polyethylene check sample eliminates any concern over instrument management.
- Screening options are available for chlorine and even antimony in plastics.



Check sample



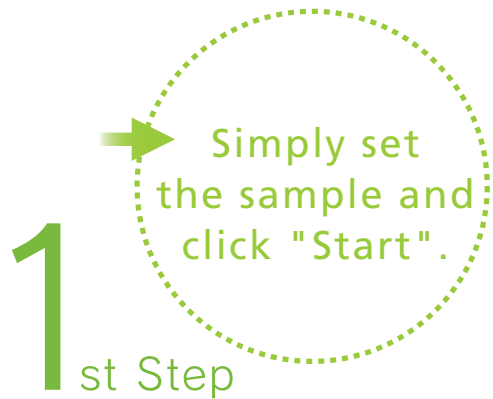
Contents

Easy Screening, Even for First-Time Users	P. 4	Features of EDX-LE Plus	P.10
Screening Software Features	P. 6	Proposed Screening Method for RoHS Directive	P.12
A Variety of Functions To Make Screening Easier	P. 7	Instrument Specifications	P.14
All-in-One Design Includes All Functions for RoHS/ELV Screening	P. 8		

Making the Difficult Simple

Easy Screening, Even for First-Time Users

Start the sample measurement easily from the "Screening Analysis" window. 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 be confident in their results.



Place the sample in the chamber

- Place the sample inside and the observation camera will confirm the sample's position.
- Set the analysis area to 3 mm, 5 mm, or 10 mm diameter.
- Close the sample chamber.



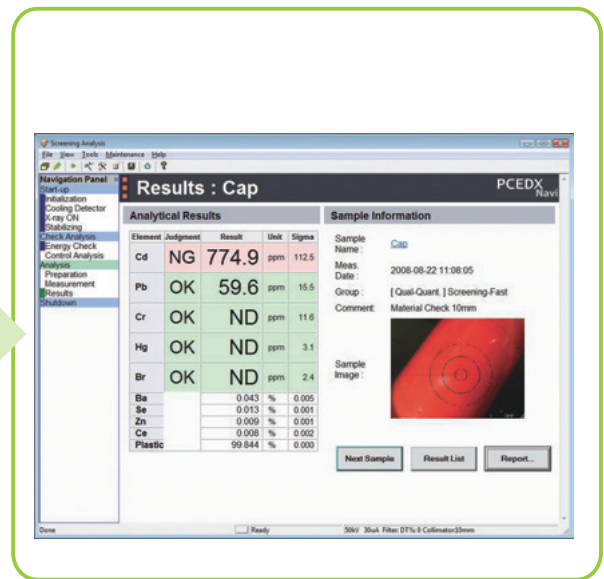
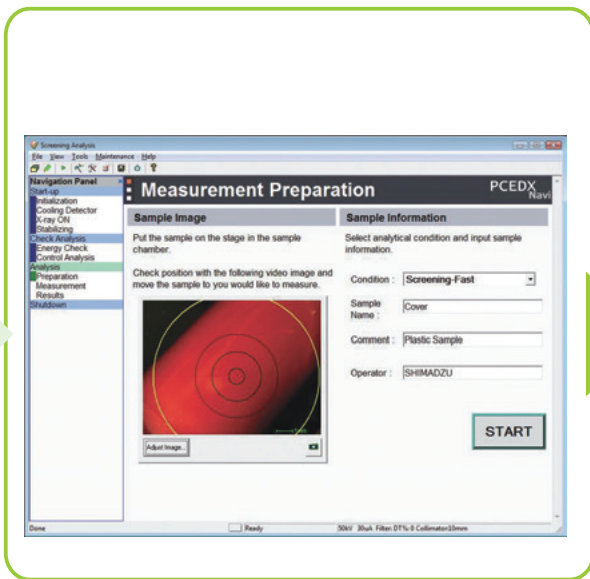
To check the results to date...

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

Time	Element	Value	Unit	Status	Element	Value	Unit	Status	Element	Value	Unit	Status	Element	Value	Unit	Status
2015-02-19 10:12	Cd	ND	[28.0] ppm	OK	Pb	ND	[20.0] ppm	OK	Cr	ND	[12.4] ppm	OK	Pg	ND	[5.0] ppm	OK
2015-02-19 10:41	Cd	717.0	[106.0] ppm	NG	Pb	ND	[16.0] ppm	OK	Cr	ND	[11.0] ppm	OK	Pg	ND	[2.0] ppm	OK
2015-02-19 10:51	Cd	ND	[25.0] ppm	OK	Pb	29043.4	[1425.1] ppm	NG	Cr	1083.7	[182.0] ppm	NG	Pg	ND	[49.0] ppm	OK

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.

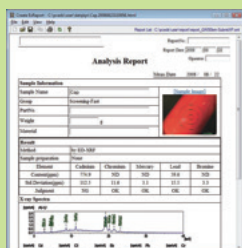
Analysis results are displayed

- After measurements are completed, "Pass/Fail Judgment", "Concentration", and "3 σ (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

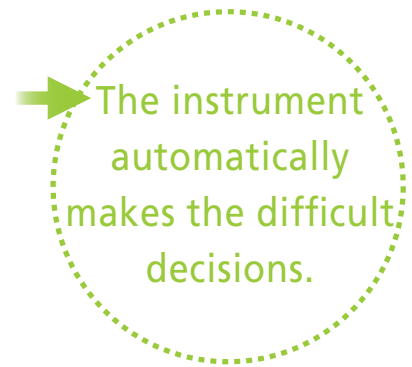


Create reports in Excel or HTML format. Reports can also be created for non-RoHS 5 element data.

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

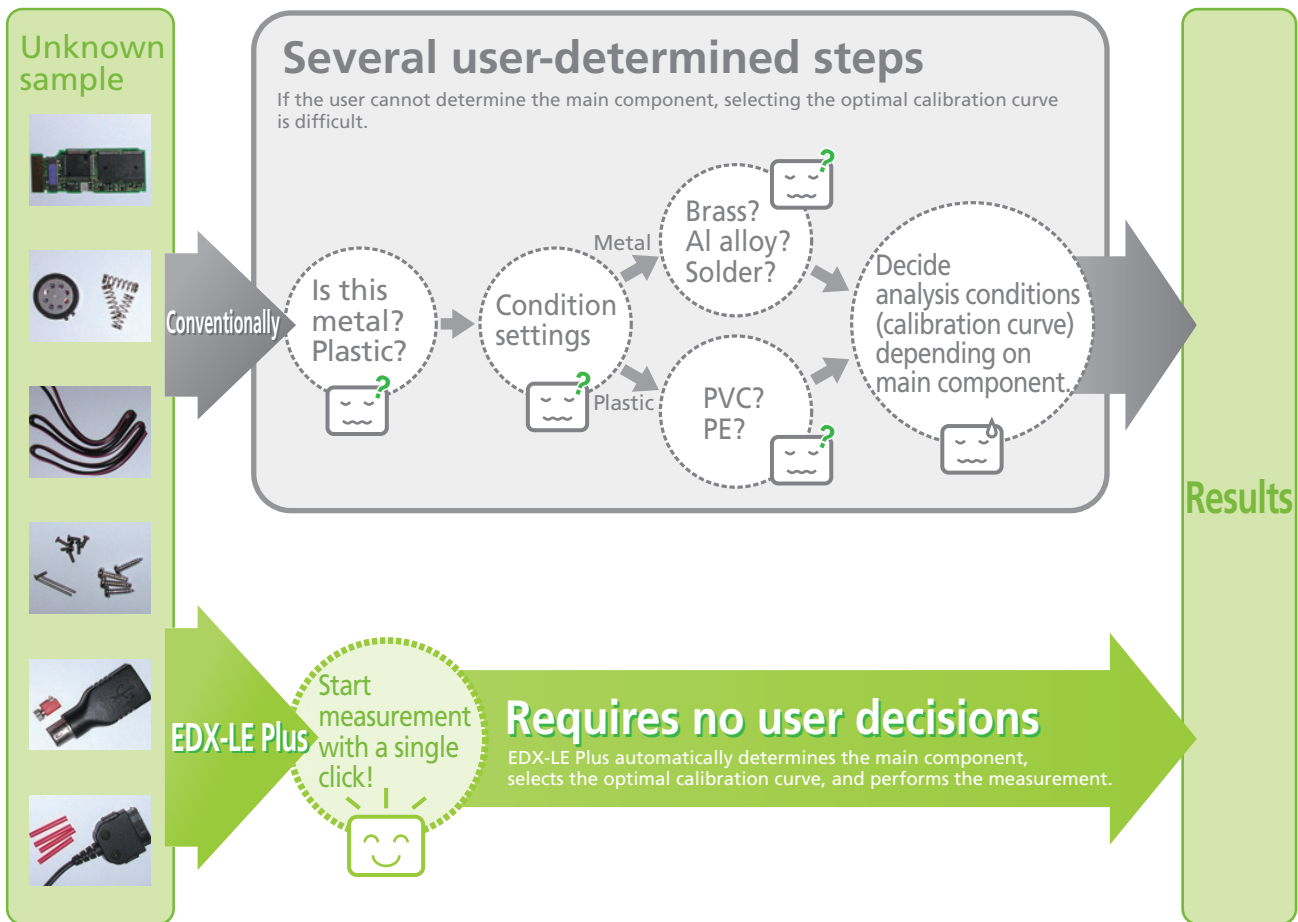
Screening Software Features

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

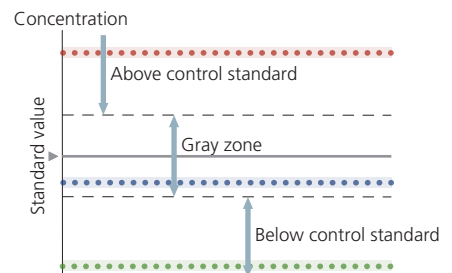
Automatic Calibration Curve Selection Function



Automatic Measurement Time Reduction

This function automatically switches to the next analysis channel if a controlled substance clearly has a high or low concentration, making evaluation possible while measurement is underway. This achieves more efficient screening analysis.

- Clearly above the control standard, so measurement is cut off.
- Gray zone. Measurement proceeds for the set time.
- Clearly below the control standard, so measurement is cut off.



A Variety of Functions To Make 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, the user can refer to lower threshold limits for each material to aid in setting their own threshold values.

Condition List	Threshold	Judgment Display	Report Template			
Screening	Settings of Threshold(ppm)					
ScreeningFast	Material					
	Plastic	Al	Fe	Cu	Sn	
Element	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		<input checked="" type="checkbox"/> Time Reduction			
Estimated Time	6 minutes	6 minutes	16 minutes	16 minutes	16 minutes	

Improved Security for Software Operations

Condition Protection Function

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



Changing Judgment Character Strings

The user can specify 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.

Changing the Report Template

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

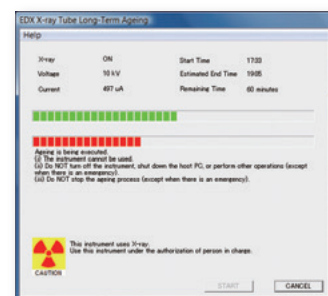
A Variety of Functions To Minimize Instrument Maintenance Requirements

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 Plus 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 for RoHS/ELV Screening

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

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

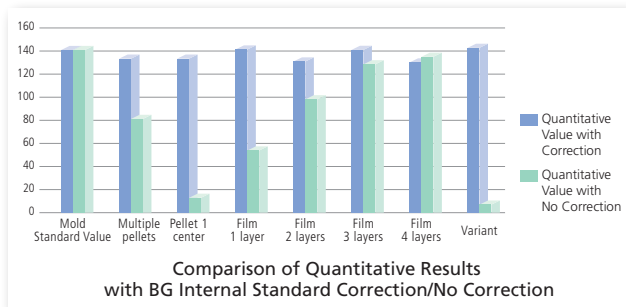
Obtaining Highly Reliable Analytical Results Calibration Curve Method and FP Method

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 instead for 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 Plus utilizes a BG internal standard method* to eliminate the effect of shape and thickness, providing highly precise results.



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

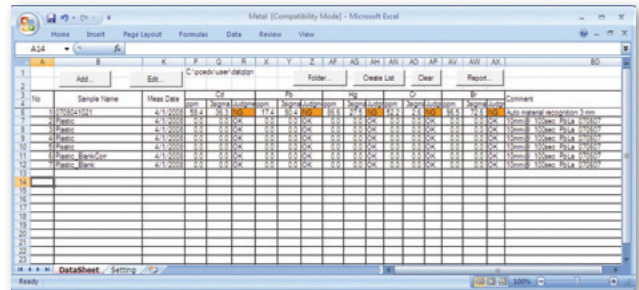
Large Sample Chamber

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® file format.

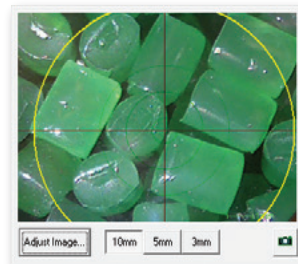


Note that this requires installation of Microsoft® Office Excel® before use.

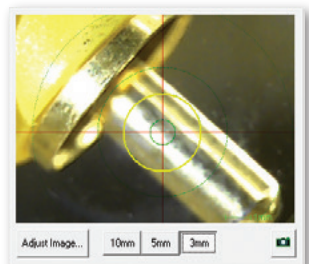
Accommodates a Variety of Samples

Sample Observation Function

When measuring foreign substances and samples with multiple parts, the sample observation camera allows the analysis position to be specified easily 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.



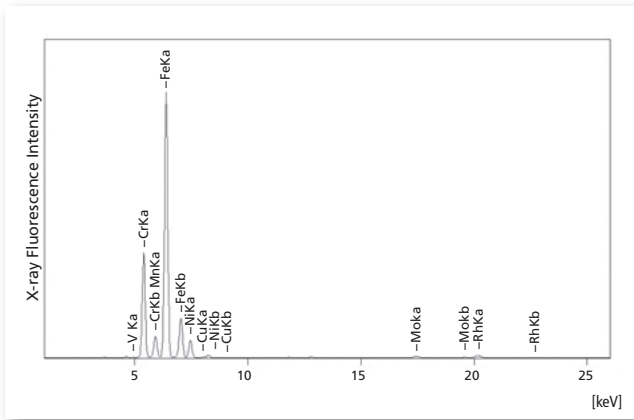
10 mm dia. image (plastic)



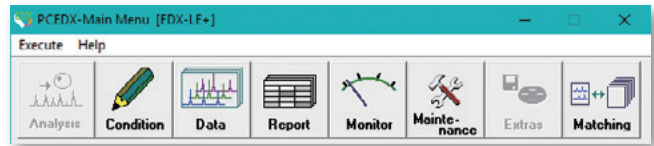
3 mm dia. image (metal)

Qualitative-Quantitative Analysis

General analysis software is included as standard, to support non-standard quantitative analysis based on the FP method.



Qualitative Profile of Stainless Steel

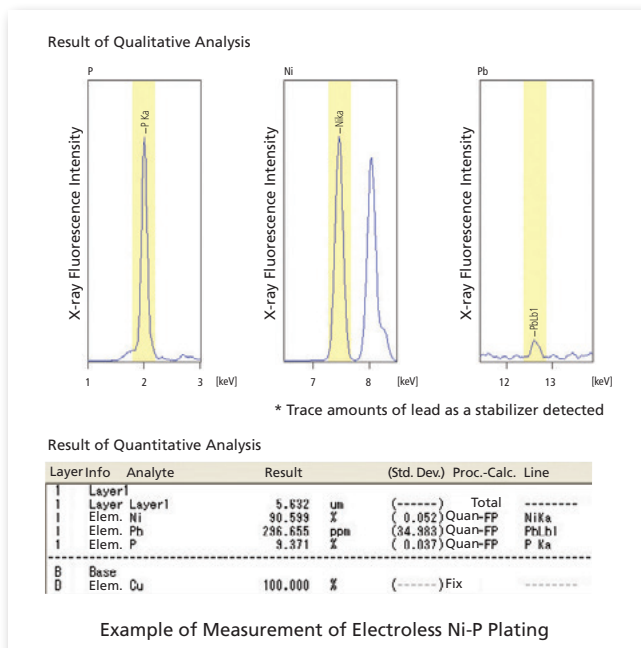


Analyte	Result	[3-sigma]	Proc.-Calc.	Line
Fe	71.448 %	[0.241]	Quant.-FP	FeKa
Cr	18.810 %	[0.105]	Quant.-FP	CrKa
Ni	7.662 %	[0.105]	Quant.-FP	NiKa
Mn	1.446 %	[0.054]	Quant.-FP	MnKa
Cu	0.339 %	[0.033]	Quant.-FP	CuKa
Mo	0.242 %	[0.009]	Quant.-FP	MoKa
V	0.053 %	[0.014]	Quant.-FP	V Ka

Quantitative Analysis Results for Stainless Steel (FP Method)

Thin-Film Analysis

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 is needed about the constituent elements and the layer order including the base.)



Features of EDX-LE Plus

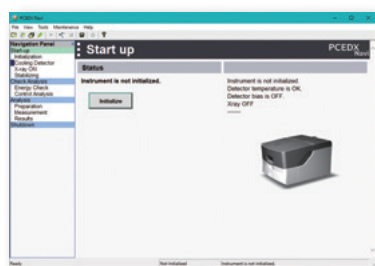
- Easy operability ensures even first-time users can start screening with confidence
- SDD detector enables high-sensitivity and high-speed analysis
- High energy resolution provides strong support for samples with a complex elemental composition



Easy Operability Ensures Even First-Time Users Can Start Screening with Confidence

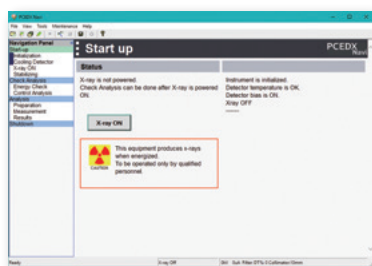
Easy operability is not limited to measurement operations. Operations for starting up and checking the instrument (energy check and quantitative value control analysis) are easy and reliable too.

Startup in Three Steps



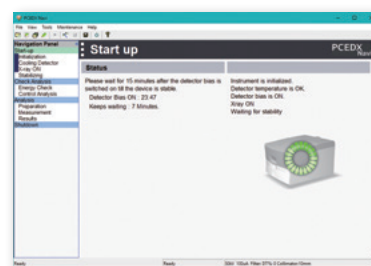
Initialize device.

Simply click **Initialize**



Switch X-ray emission ON.

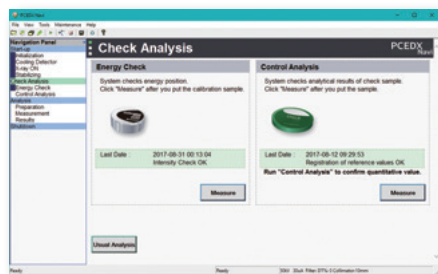
Simply click **X-ray ON**



Wait for detector to stabilize.

The instrument will not move to the next step until stabilization is complete. (This ensures the instrument only operates when fully-stabilized.)

To Check the Device Settings, Simply Follow the Instructions on the Screen



Check energy using the provided calibration sample. An illustration of the sample to be used is displayed, which eliminates any concern about using the wrong sample.

An energy check simply consists of placing the calibration sample in the sample chamber and clicking **Measure**.

Similarly, for quantitative value control analysis, simply place the provided check sample in the sample chamber and click **Measure**. The software assists with managing the timing of control analysis by displaying a message if too much time has elapsed since the last control analysis.

Last Date : 2017-08-12 09:29:53
Registration of reference values OK
Run "Control Analysis" to confirm quantitative value.

Hardware with Extensive Functionality

High-Powered X-Ray Generator

The high-powered X-ray generator (max. 50 kV tube voltage, max. 1,000 μ A tube current, and max. 50 W output) enables high-sensitivity analysis.

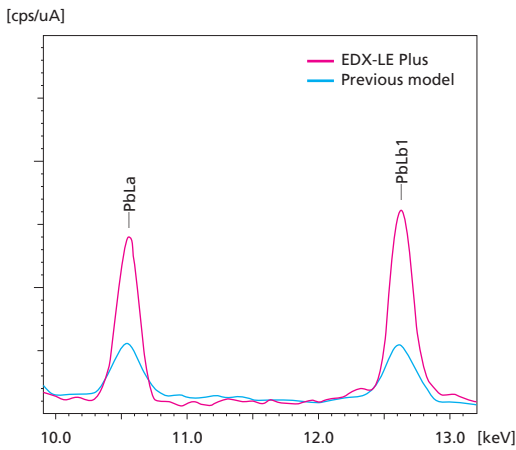
Equipped with Five Types of Primary Filters

Five types of primary filters are included (six if the OPEN position is included) for analyzing a wide range of elements, including RoHS elements.

SDD Detector Enables High-Sensitivity and High-Speed Analysis

Around Twice the Sensitivity

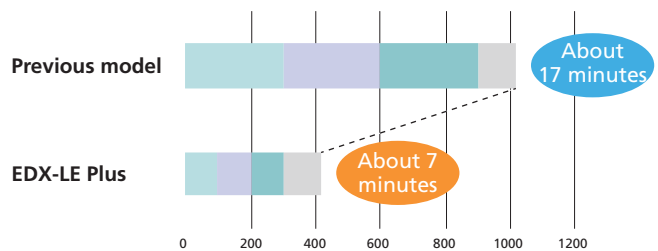
The lower detection limit for RoHS elements is about half the level of the previous model used for RoHS-directive-restricted material analysis.



Comparison of Lead Profiles in a Copper Alloy

Less Than Half the Measurement Time for Metal Samples

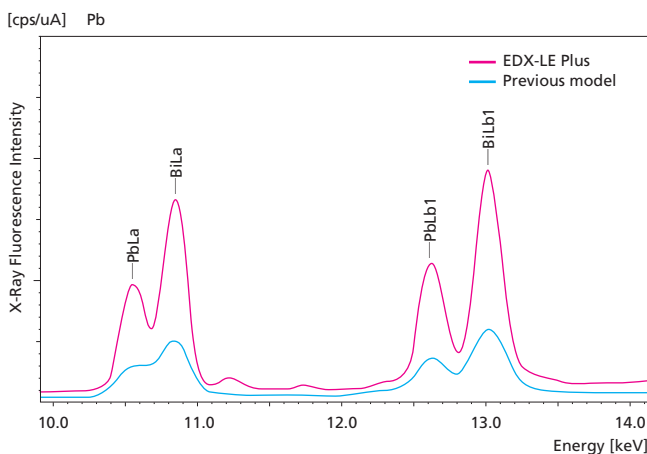
Compared to the previous model used for RoHS analysis, it requires less than half the time for metal sample measurements.



Comparison of Time Required to Measure Metal Samples
(In screening mode, with automatic time reduction function OFF)

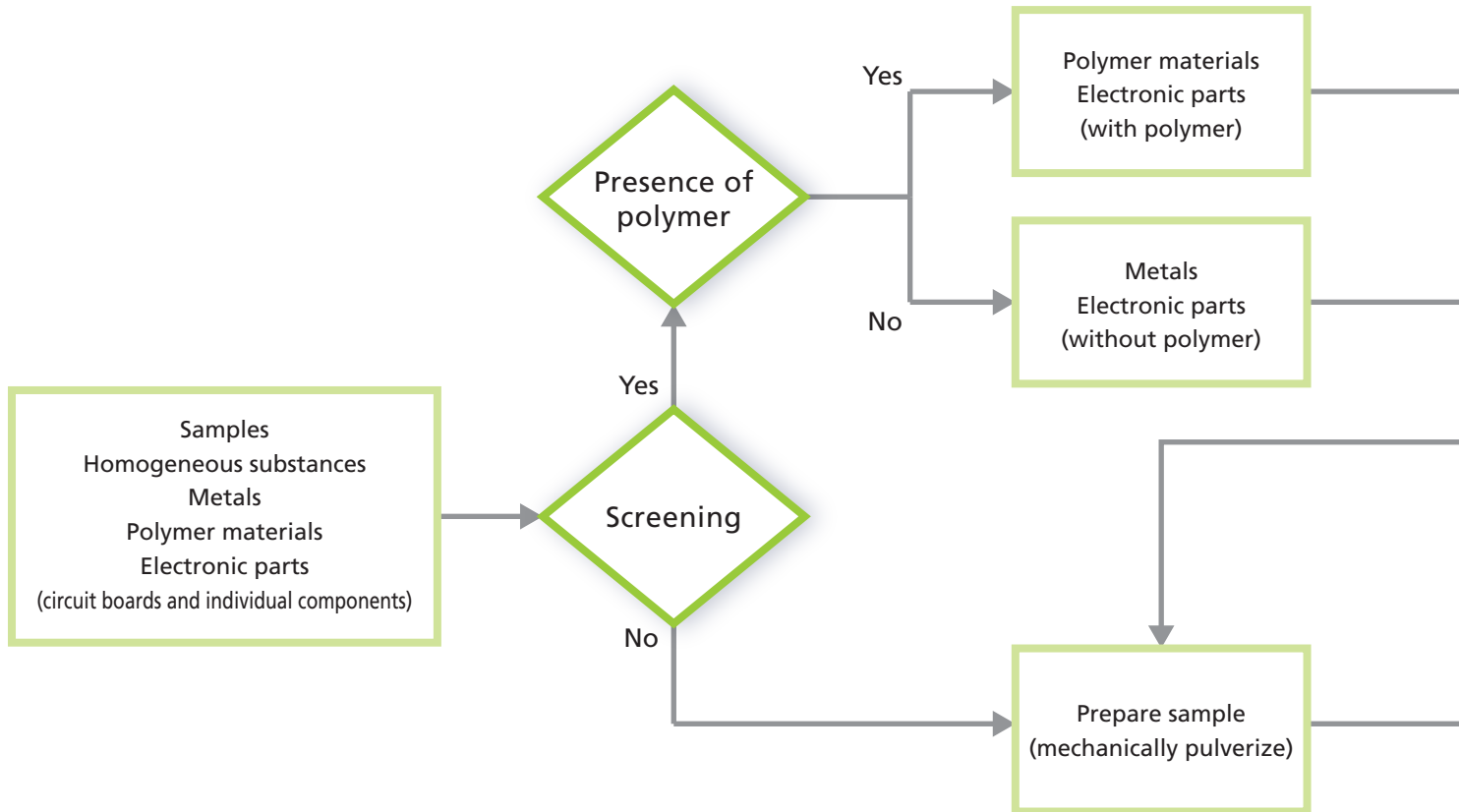
High Energy Resolution Provides Strong Support for Samples with a Complex Elemental Composition

Since SDD detectors can provide both high sensitivity and high energy resolution, they are ideally suited for screening applications, such as for composite materials containing many elements.



Proposed Screening Method for RoHS Directive

Shimadzu offers customers comprehensive assistance in complying with RoHS/ELV requirements. In addition to developing and manufacturing energy-dispersive X-ray fluorescence spectrometers (EDXRF), which account for a large portion of the 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). Shimadzu develops applications for this equipment and even offers guidance for testing methods.

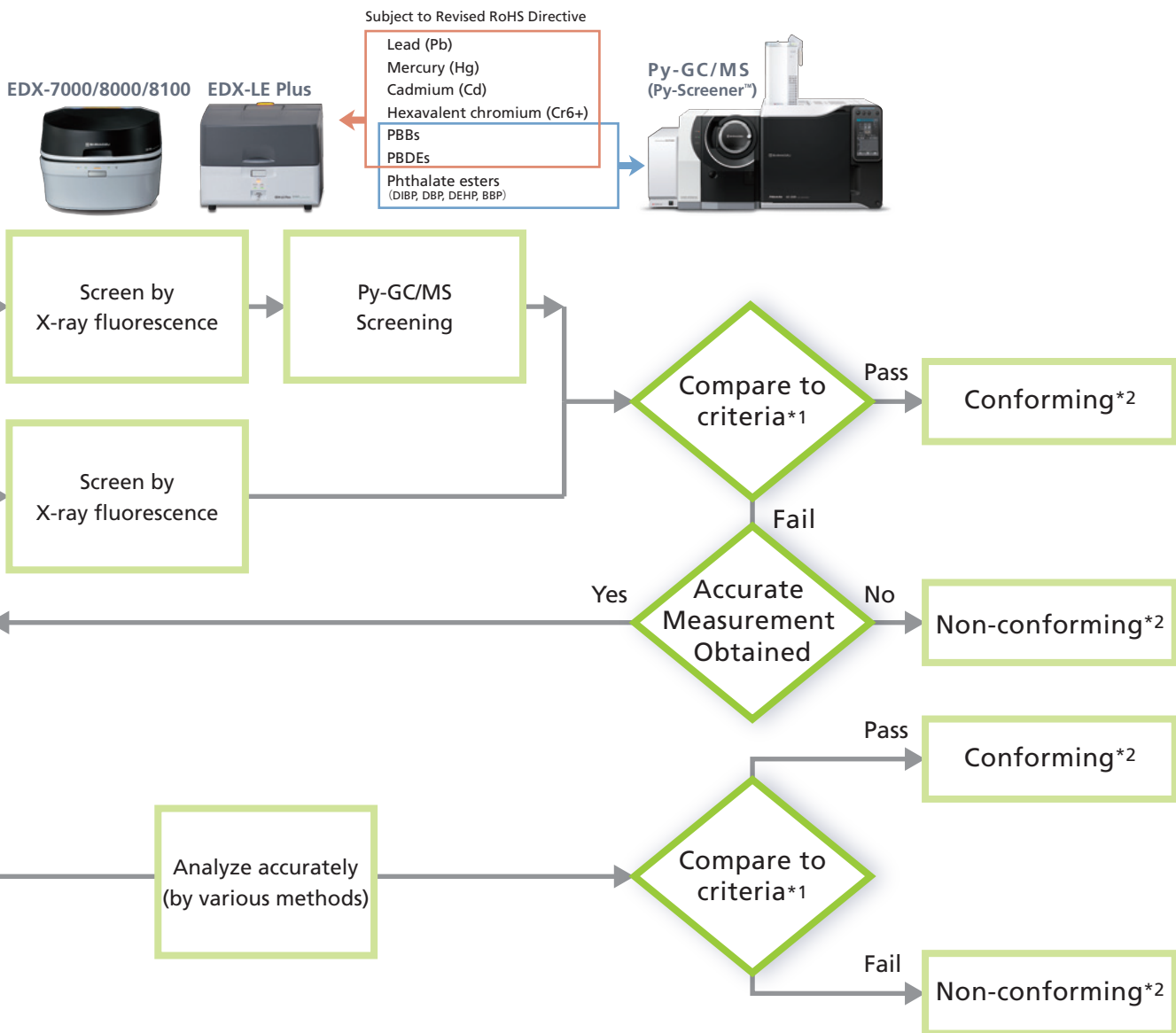


Substances Restricted by RoHS II and Start Date

Restricted Substances	Max. Allowable Conc.	Date of Applicability (Categories 1 to 7 and 10)	Date of Applicability (Categories 8 and 9)	Date of Applicability (Other Electrical and Electronic Equipment)		
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	0.1%	July 22, 2019	July 22, 2019		
	PBDE	0.1%				
Phthalate esters	DEHP	0.1%			July 22, 2021	July 22, 2019
	BBP	0.1%				
	DBP	0.1%				
	DIBP	0.1%				

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, and 10: Automatic dispensers



AA-7000 Series



ICPE-9800 Series



ICPMS-2030



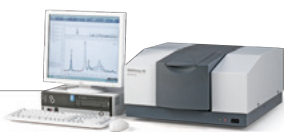
UVmini-1280



GCMS-QP2020



IRAffinity-15



Prominence™ HIC-NS/HIC-SP



*1: Pass/fail criteria are determined by each organization.

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

Instrument Specifications

Primary Specifications

Measurement Principle	X-ray fluorescence spectrometry
Measurement Method	Energy dispersive
Measurement Sample Type	Solid, liquid, or powder
Elements to be Detected	^{13}Al to ^{92}U
Sample Chamber Size	Max. W 370 mm × D 320 mm × 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 1, 3, 5, and 10 mm dia. areas
Primary Filter	Automatic switching between: 5 types + OPEN

Detector

Type	Silicon-drift detector (SDD)
LN ₂ Supply	Not required
Counting Method	Digital filter counting

Sample Chamber

Measurement Atmosphere	Air
Sample Observation	CCD camera

Data Processing Unit

Memory	2 GB min. (32-bit), 4GB min. (64-bit)
HDD	240 GB min.
Resolution	1024 × 768 pixels min.
CD	CD-ROM drive
OS	Windows® 10 (32-bit/64-bit)*

* Microsoft Office is not included in this OS.

Software

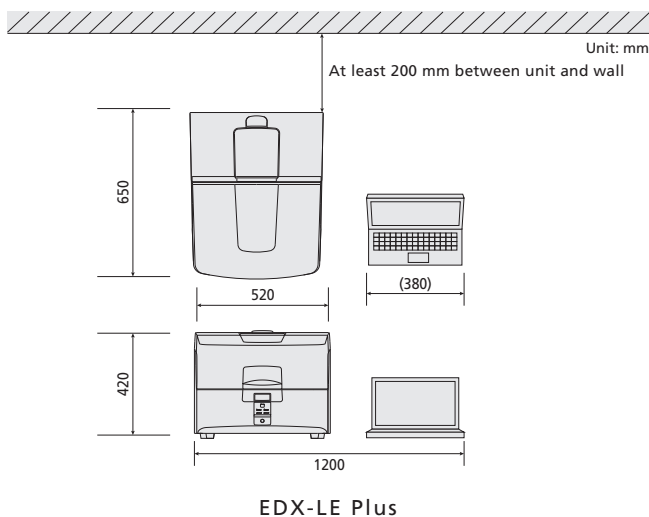
Screening Analysis	Simple operation software
Qualitative Analysis	Measurement/analysis software
Quantitative Analysis	Calibration curve method, FP method, Thin-film FP method
Utilities	Energy Check, Control Analysis
Other Functions	System Status Monitoring Function Analysis Results Tabulation Function 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 × D 650 mm × H 420 mm
Main Unit Weight	Approx. 60 kg



Options

Halogen Screening Analysis Kit

212-26325-41

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

212-26326-41

This kit includes an instruction manual and a check sample required for measurement of 7 elements including antimony and elements specified in the RoHS directive and halogen regulations. (Cd, Pb, Hg, Cr, Br, Cl, and Sb.)

Sample Cells

3571 General Open-Ended 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 PET or polypropylene films.



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 the 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 × 92 m roll)

Sample-holding film. (For light element analysis)

PET Film

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

Sample-holding film. (For heavy element analysis)

RoHS Compliance Screening Analysis Instruments

Screening System for Phthalate Esters

Py-Screener



This system is designed for screening for phthalate esters in polymers. The use of phthalate esters is restricted in toys, food packaging etc. They are expected to be regulated as restricted substances under the RoHS (II) Directive.

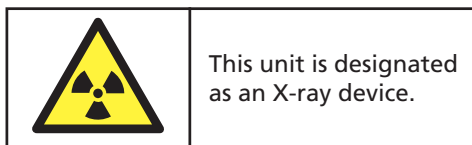
The system supports a series of procedures from sample preparation to data acquisition, analysis, and maintenance. It consists of special software, special standard samples, and a sampling toolkit. It is easy to operate, even for novices.

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 the series.
- **Accommodates Various Types and Sizes of Samples**
EDX-7000/8000/8100:
The combination of Small Spot Analysis Kit and EDXIR-Analysis™ Software facilitate 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 detector has a wide range and can detect elements from C to U.
PCEDX-Navi software makes RoHS-directive-restricted material analysis and report creation easy even for beginners.



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X-Cell is a trademark of SPEX SamplePrep, LLC.



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