

# Portable XRF Solutions for Customs & Border Inspections



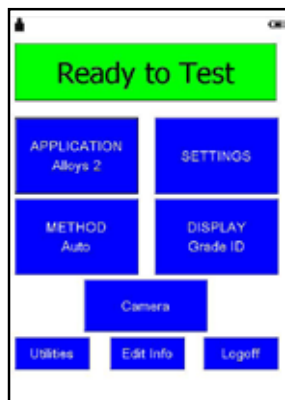
- Quickly and non-destructively confirm precious metals and common alloys or identify specialty alloys known for use in weapons of mass destruction - WMD
- Screen import goods on-site for restricted substances in consumer goods, electronics, tobacco, and food or agriculture products to minimize cost and time of lab analysis
- Light-weight and ready to go: battery or AC powered; USB, Bluetooth & Wi-Fi connectivity; and interactive touchscreen operation for fast, actionable results



Portable X-ray fluorescence (XRF) spectrometry is a fast, non-destructive tool to identify precious metals, common or specialized metal alloys, and to screen for restricted materials such as chromium, arsenic, bromine, cadmium, lead, and mercury in consumer goods. It is convenient and safe for testing small or large volumes of materials anywhere it's needed, even at remote inspection stations.



Bruker's portable XRF analyzers can be configured with readily available standard factory calibrations that enable "point-and-shoot" analysis of liquids, solids, and powders in multiple shapes, sizes, and matrices. Customized calibrations can also be designed as per required specifications with reference samples. Bruker even provides EasyCal PC software for customers to develop their own calibrations for proprietary material inspections.



Factory ready calibrations are available to enable point-and-shoot analysis for a variety of applications.

PXRF also helps identify unique materials which have no reference samples for comparison. Bruker Instrument Tools (BIT) PC software provides the ability to visualize, identify, and analyze the relative elemental content of a sample during live spectra data acquisition and allows for easy transfer of files. Artax is an even more comprehensive PC software option.



## Alloys & Metals

The Alloy Calibration enables rapid identification of both common steels: stainless, tool, and low-alloy; and specialty alloys including nickel, copper, zinc, aluminum, magnesium, and titanium alloys. It incorporates a general calibration for all other alloy types and pure metals. With multiple pre-installed Alloy Grade Libraries for ID, it is applicable for large or small samples in solid or powder form. Unique alloy grade libraries can be created and stored.

El	Min	%	Max	+/[-] [%]
Fe	80.00	70.40	75.00	1.07
Cr	16.00	16.25	18.00	0.45
Ni	10.00	11.40	14.00	0.50
Mo	2.00	1.63	3.00	0.10
Sn		0.21		0.09
Nb		0.11		0.06
Ti	0.00	< LOD	0.00	0.14
Mn	0.00	< LOD	2.00	0.24

El	Min	%	Max	+/[-] [%]
Al	90.000	93.846	98.000	0.681
Mg	4.000	4.778	4.900	0.572
Mn	0.200	0.867	1.000	0.083
Fe	0.000	0.226	0.500	0.028
Si	0.000	0.130	0.400	0.056
Cr	0.050	0.084	0.250	0.029
Cu	0.000	0.026	0.100	0.006
Ti	0.000	0.019	0.150	0.003
Zn	0.000	0.013	0.250	0.004

Multiple Alloy Grade libraries are pre-installed for the Alloys Calibration to enable fast identification of unknown alloy samples.

## Precious Metals

The Precious Metals Calibration enables fast screening for valuation of pure precious metals including gold karat. Portable XRF also measures numerous alloying elements in: industrially relevant precious metals (platinum, rhenium, iridium, ruthenium, rhodium, palladium, silver, etc.), dental alloys (platinum, gold, palladium, silver, rhodium, cobalt, titanium, chromium, molybdenum, zirconium, indium, tin, antimony, etc.), genuine jewelry (platinum, gold, palladium, iridium, silver, nickel, zinc, copper, etc.), and adulterated jewelry (tungsten, lead, chromium, iron, zirconium, etc.).



18.1 K Gold		
100 Match EXACT 12-18 12:09		
Time 49.0		
El	%	+/- [%2]
Au	75.29	0.16
Ag	24.66	0.10
Cu	0.03	0.01
Fe	0.02	0.01

Spectrum

## Ores & Minerals

The Geochem Calibration enables analysis of primary metals, ores, and concentrates for raw minerals import and export control. In addition to helping determine ore grades and screen for heavy metals, of particular interest to many regions is its ability to analyze rare earth elements as well as other technology metals such as cobalt, tungsten, and tantalum. It also measures transportation metals such as aluminum and titanium. This calibration helps identify potential conflict minerals such as cassiterite for tin, wolframite for tungsten, coltan for tantalum, and gold ore.

## Fuel & Oils

The Sulfur in Fuel Oil Calibration enables rapid screening of fuel samples to ensure compliance with Marine Pollution (MARPOL) regulations on high concentrations of sulfur from 0.1 to 5%. Any sample can be tested including those taken from the engine feed or returning line. The Metals in Oil Calibration is for multi-elemental analysis of oil based liquid samples to check for wear metals in used oil, additives in lubricants, and other contaminants in oil which are indicative of detergent dispersants, salt water, antifreeze coolant leakage, or dirt and airborne contaminants.

S in Marine Fuel		
43-08-06 16:24		
Time 60.0		
El	%	+/- [%2]
S	0.1005	0.0014

Use in Average

Averaging Calculate Average

Image Edit Info Back



## Electronics



The Restricted Materials Calibration helps determine if imported electronics meet RoHS restrictions and if there is a possibility of counterfeiting.

Electronic products are comprised of printed circuit boards, electrical components, cable connectors, and specialty solders depending on their use. This calibration is used for fast and non-destructive screening for heavy metals such as lead, mercury, chromium, cadmium and bromine. Additionally, it can be used to monitor the presence of copper, gold, silver, and/or other precious metals to ensure the product is not counterfeit.



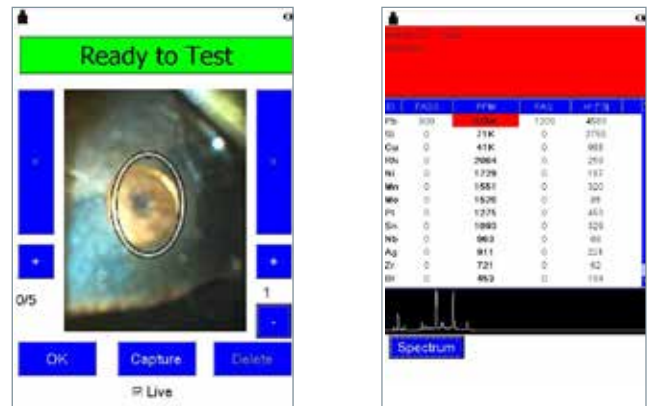
An internal camera can be used to position and save a visual record of the sample of interest, from electronic components to children's jewelry. Results can be viewed as composition, spectra, or pass/fail. Limits can be preprogrammed utilizing known regulations or user-specified ones. XRF determines total elemental concentration; "inconclusive" will appear if it detects an excess of elements, such as bromine or chromium, which are restricted only in some forms.

## Consumer Goods

The Restricted Materials Calibration is also ideal for fast, non-destructive screening of consumer products for heavy metals before they cross the border. Toys, trinkets, clothing and decorative objects aren't the only products which can contain high levels of toxic metals. Personal care products including nutraceuticals and cosmeceuticals also need to be safe from dangerous levels of lead, mercury, chromium, cadmium and bromine.



This calibration enables compliance with the RoHS Directive and CPSIA/HR4040 for detection of heavy metals in toys and consumer products; ASTM F963 Standard Consumer Safety Toy Specification for arsenic, antimony, lead, cadmium, barium, chromium, mercury, and selenium; and TPCH Toxic Packaging Clearing House for mercury, lead, cadmium, and chromium.



When an item contains dangerous levels of a particular element, such as lead at levels over set limits, results will clearly indicate a failure.

## Food Products



The Food Quality Calibration provides fast, non-destructive screening of bulk food material such as spices, teas, powdered milk, candy, cereals, grains, and feed. It is ideal for monitoring nutrients, fortificants, adulterants, heavy metals and other contaminants.

The Restricted Materials Calibration also covers calibrations to measure packaging, storage containers, and other food contact materials.



Select Analysis Type	
Alloys SMARTGrade 2	
Filter_mg_cm-2	
Food Safety	
<b>FoodQuality</b>	
FoodQualityLowZ	
GeoExploration	
GeoMining	
Maritime Sulfur	
PlantsF1	
Precious Metals 2	
Restricted Materials	
Shavings and Turnings 2	
Soil	
Spectrometer Mode	

Food Quality LowZ		
571 08-19 11:20		
Time 60.0   15FoodQuality		
EI	%	+/- [*1]
<b>K</b>	<b>1.30</b>	0.00
<b>Ca</b>	<b>0.91</b>	0.00
<b>P</b>	<b>0.71</b>	0.00
<b>S</b>	<b>0.35</b>	0.00
<b>Cl</b>	<b>0.26</b>	0.00
<b>Mg</b>	<b>0.47</b>	0.11

## Agricultural Products

Three calibrations are available for agricultural products to measure nutrients and screen for heavy metals or other dangerous elements. The Plant Material Calibration is for multi-elemental analysis of cellulose based plant tissue samples and is ideal for leafy plant imports including tobacco which is often ID'd as counterfeit when heavy metals are present.

120 Plants PASS				
Time 35.0				
EI	PASS	PPM	FAIL	+/- [*2]
Ni 90	0	100	2	
Cu 90	7	100	1	
Zn 90	62	100	2	
Pb 90	0	100	5	
K 0	25K	0	386	
Ca 0	13K	0	224	
Fe 0	227	0	10	
Br 0	30	0	2	
Rb 0	8	0	2	

124 Plants FAIL				
Time 27.0				
EI	PASS	PPM	FAIL	+/- [*2]
Ni 90	17	100	3	
Cu 90	129	100	3	
Zn 90	554	100	9	
Pb 90	135	100	7	
K 0	11K	0	163	
Ca 0	116	0	87	
As 0	6	0	0	
Se 0	17	0	4	

The Inorganic Fertilizer Calibration is ideal for measuring major minerals, monitoring trace minerals, and screening for high levels of heavy metals. Although typically not intentional, they can be present from initial mineral sources. The Heavy Metals and Nutrients in Soil Calibration is ideal for screening high levels of heavy and other detrimental metals in soils before passing a border. All three calibrations work for elemental concentrations ranging from low PPM to low percentage levels.



**Bruker Portable XRF Elemental Analyzers:** *Simultaneously measure elements from sodium (Na) to uranium (U) at concentrations as low as parts-per-million to high percentage levels (depending on the element). Objects of any form can be analyzed wherever they are located.*

Bruker's portable XRF analyzers are primarily used for quantitative analysis utilizing installed calibrations with like-sample standard reference materials. Results can be given as composition or Pass/Fail/Inconclusive for single or multi-elemental analysis of elements from Na to U, depending on the model. Spectra is always being collected with each measurement enabling live viewing or subsequent retrieval of stored data. Researchers primarily use this data to identify the presence of elements or to track estimates and/or ratios of elements of interest for qualitative or semi-quantitative work.

The convenient form factor of Bruker's CTX is ideal for samples presented in containers such as powders, soils and liquids; small samples; and those which require extended measurements of more than a few seconds.

Handheld XRFs enable in-situ measurements; in other words, they are "point-and-shoot" analyzers. An optional desk or bench top stand with a PC is typically used for samples presented in containers such as powders, soils and liquids; small samples; and those which require extended measurements of more than a few seconds.

**Bruker's portable XRF features:**

- Rh X-ray tube with high performance SDD detector
- 5 filter wheel (plus manual slot for TRACER 5)
- SharpBeam geometry for high performance, speed and sensitivity
- Touchscreen operation
- Internal camera (optional for CTX and TITAN)
- Wireless communication
- Battery or AC operation
- Lightweight and supplied with water tight transport case; Optional backpack for CTX
- Optional PC software available for qualitative analysis (Artax) or user generated calibrations (EasyCal)
- Optional factory installed calibrations available for various models including applications for:
 

• Precious Metals	• Food Quality
• Alloys	• Plant Materials
• Metals in Oil	• Inorganic Fertilizers
• Coatings	• Maritime Sulfur
• Hg Contamination	• Industrial Lead in Paint
• Mudrock, GeoExploration	• Filter & Dust Wipes
• Limestone	• Glass
• Heavy Metals & Nutrients in Soil	• Ancient Copper Alloys
• Restricted Materials (RoHS)	• Custom factory calibrations



**CTX™ Portable XRF analyzer**  
Mg (12) to U (92)



**TRACER 5 Handheld XRF analyzer**  
Na (11) to U (92)



**S1 TITAN Handheld XRF analyzer**  
Mg (12) to U (92)

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