

# X-MET8000 Series



## X-MET8000 SERIES HANDHELD ANALYSERS

Hitachi High-Tech's latest generation of field portable analysers offer many advantages for weld analysis:

- | Fast: carry out full PMI testing programs of metal components, assemblies and welds effectively and efficiently.
- | Bevelled nose design: reach further into tight corners. No compromise on accuracy.
- | Optional small-spot collimator (3mm-diameter): analyse the weld only, not the surrounding material.
- | Compact and lightweight: (1.5kg with battery), the X-MET8000 is fully portable, for true on-site analysis.
- | Rugged: its IP54 rating ensures durability and low cost of ownership. Ideal for outdoors use and dirty environments.

## X-MET8000 Series for rapid analysis of welds and welding materials

### BACKGROUND

Welding is the process of joining materials, typically pieces of metal, by melting their edges and fusing them together.

Welding dates back as far as the bronze and iron ages. Since then, many different welding methods have been developed, using for example different sources of energy to melt the metals, and allowing new materials to be welded together. The strength and integrity of a weld depend on the base metals and filler materials' compositions, the welding method, the geometry of the welding joint, etc.

In plants where safety is critical (e.g. power generation, oil and gas), components used in the process line, including welds, are tested at various stages of their life-cycle to ensure integrity and prevent failure.

Handheld x-ray fluorescence (HHXRF) is commonly used to carry out rapid, on-site weld analysis (material identification and chemistry) because of its ease of use and its non-destructive nature. HHXRF enables the user to:

- | Verify that the alloys to be welded together are of the specified grade and chemistry.
- | Avoid mix-ups and check the appropriate filler material is used.
- | Confirm the weld meets specification during final acceptance tests.
- | Verify in-service welds during positive material identification (PMI) inspection programs.



## CALIBRATION AND PERFORMANCE

The X-MET8000 Optimum and Expert, for which the small-spot collimator is available as an option, are optimised for high speed grade identification and accurate analysis of a wide variety of alloys, from aluminiums to high temperature alloys to steels etc.

They can determine up to 35 elements in seconds, from Magnesium (Mg) to Uranium (U), depending on the application.

By focusing the X-ray beam on a 3mm diameter spot on the sample, the X-MET can isolate specific features or components (such as welds) from the surrounding material, providing accurate results for the targeted area.

With the live camera image enabling the operator to position the snout of the analyser on the area to measure, the operation of the X-MET is truly "point and shoot".

To maintain high performance and speed of analysis when the collimator is used, the calibrations parameters have been optimised: all the operator has to do is measure for 3 times longer to get the same grading and analysis performance!

## GRADE LIBRARY

The X-MET's pre-loaded grade libraries include over 1,600 alloys, ensuring an accurate grade ID every time. The operator can switch between libraries on the analyser itself, so that grade names and specifications match the material's origin. New grades can also be added to the existing libraries, and entire new libraries created (e.g. for filler materials) without having to connect the analyser to a computer.

## DATA MANAGEMENT

The X-MET8000 stores up to 100,000 results in its internal memory, including spectra and camera image.

Additional, user-defined information can be added at the time of analysis, such as location, sample description, part or job number, etc.

Results reports can be downloaded directly to a USB memory key, or sent via WiFi to a networked computer, as a CSV file, or in a tamper-proof PDF format for ultimate data integrity.

PMI INSPECTION

**HITACHI**  
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### CERTIFICATE OF VERIFICATION

Name Weld	Class	Date	Time	Duration				
	AlloyLEFP	26/08/2014	15:14:25					
Element	Fe %	Mn %	Si %	Cu %	Ni %	Cr %	Pb %	Mo %
±	98.29	0.73	0.28	0.21	0.16	0.15	0.08	0.02
	0.089	0.041	0.036	0.026	0.026	0.015	0.024	0.004

Grades: C-1026 (0.00)

Reference:

Batch No.: 280714-A

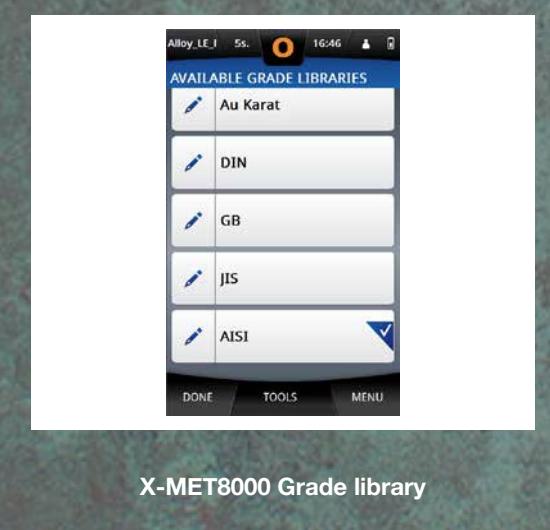
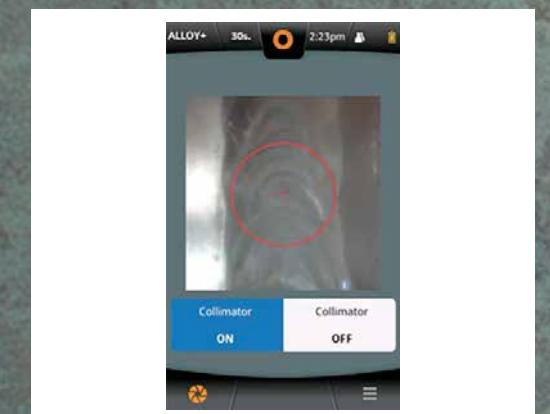
Location: Warehouse Unit 24

Part No.: RF12nB

J. Mills



Analysis of small, hard-to-reach areas with the X-MET8000



X-MET8000 Grade library

## WELD DILUTION AND COMPOSITION

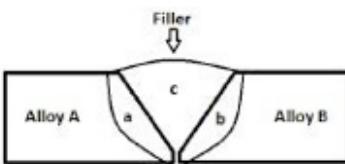
A filler is often used in the welding process to add metal to the joint. That means that the pool of melted material is a mixture of the filler and the base materials.

The filler material's elemental composition is often close to that of the pieces to be joined, but the composition of the final weld will be a combination of all the alloys that have been melted together.

Weld dilution factors depend on the materials and welding technique used, and are usually well defined. They refer to the weight of the melted base metal divided by the total weight of melted material as shown below.

$$\% \text{ dilution} = 100 * (a + b) / (a + b + c)$$

Where: a is the mass of melted Alloy A in the weld  
b is the mass of melted Alloy B in the weld  
c is the mass of melted filler in the weld.



To calculate the content of an element in the weld bead, the following equation can be used:  $\% \text{ Element in weld} = [(\% \text{ in Alloy A} \times a) + (\% \text{ in Alloy B} \times b) + (\% \text{ in filler} \times c)] / (a + b + c)$

## CONCLUSION

With its bevelled snout that can reach into tight corners, its small-spot collimator option and integrated camera, the X-MET8000 is the handheld analyser of choice for the reliable testing of welds, from the initial verification of the metals to be welded through to the finished weld.



## ORDERING INFORMATION

- | X-MET8000 Optimum or Expert. Includes the compact, waterproof, rugged carrying case, a wrist strap and lanyard, 2 batteries, a battery charger, a USB cable to connect to a PC/laptop, 5 replacements windows, and the user manuals.
- | Small-spot collimator option (P/No. 54-4106453).
- | Integrated camera (P/No. 54-4106247). Required for the accurate positioning of the X-MET on the sample when using the collimator. Included on the X-MET8000 Expert, optional on the Optimum.

Visit [www.hitachi-hightech.com/hha](http://www.hitachi-hightech.com/hha) for more information.

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