X-MET 8000 Expert — Technical Datasheet and Equipment Overview

Classification: Handheld XRF Analyzer — Flagship Alloy Verification and Trace Analysis

Executive Summary

The X-MET 8000 Expert is the flagship configuration of the X-MET 8000 series, engineered for applications where analytical uncertainty is not an option. It combines a 50 kV X-ray tube, 6-position automated filter selection, and empirical calibrations traceable to Certified Reference Materials (CRM) to deliver the highest precision and lowest detection limits available in a 1.5 kg handheld format.

Key value proposition: **Maximum analytical confidence for critical PMI, trace-level analysis, and arbitration-grade material verification in regulated industries.**

1. Physical and Environmental Specifications

Parameter	Specification
Dimensions (W x L x H)	93 x 210 x 272 mm
Weight (with 2 batteries)	1.5 kg
Ingress protection	IP54
Durability standard	MIL-STD-810G
Operating temperature	-10°C to +50°C
Max. sample temperature (standard)	120°C (248°F)
Max. sample temperature (with HERO™)	400°C (752°F)

The Expert retains the series-standard 1.5 kg weight despite housing the maximum analytical configuration, a result of deliberate engineering optimisation of the internal layout and component selection.

2. X-Ray Tube: 50 kV

Parameter	Value
Anode material	Rhodium (Rh)
Max. tube voltage	50 kV
Max. power	4 W
Max. anode current	200 µA

Why 50 kV Matters

The 50 kV maximum anode voltage provides measurable analytical advantages over lower-voltage configurations:

Shorter-wavelength bremsstrahlung — more efficient excitation of K-shell characteristic lines for elements up to Z ≈ 50 (Sn, Sb). Critical for:

- Accurate determination of W, Mo, Nb in nickel superalloys
- Tin bronze analysis
- Solder and leaded alloy verification
- General heavy-alloy analysis

Enhanced penetration — reliable analysis through:

- Thin oxide films on sample surfaces
- Paint and coating layers (within reasonable thickness limits)
- Light surface contamination

Improved high-Z element sensitivity — superior excitation efficiency for Hg, Pb, Bi, U, delivering better detection limits for trace components.

---

3. 6-Position Filter Wheel

Technical Implementation

Automatic filter changer with six discrete filter positions. The instrument algorithm selects the optimal filter based on:

1. Active measurement mode
2. Preliminary scan (QuickID)
3. Target element list and required detection limits

Practical Impact on Light-Element Analysis

Element	Without Optimised Filter	With Optimal Filter
Mg (Z=12)	High background, poor sensitivity	Clean peak, low detection limit
Al (Z=13)	Background overlap	Clear identification
Si (Z=14)	Unstable results	Reliable quantification
S (Z=16)	Undetectable on many matrices	Reliable 303/304 separation

The filter wheel is not a convenience feature — it is an analytical necessity for accurate light-element determination in complex alloy matrices.

---

4. Detector: Large Area SDD

Parameter	Specification
Type	Silicon Drift Detector (large area)
Energy resolution	~140 eV at Mn Kα (5.9 keV)
Cooling	Thermoelectric (Peltier)
Detectable range	Mg – U
Simultaneous elements	Up to 35 (application-dependent)

Energy resolution of 140 eV delivers the physical ability to resolve lines separated by ~140 eV. This enables:

- Separation of K-lines from adjacent elements
- Accurate deconvolution of complex multi-element spectra
- Elimination of false identification from peak overlap

High count-rate capability allows:

- Shorter measurement times at target precision
- Reliable 5–15 second results
- Measurement of high-fluorescence samples without detector saturation

---

5. Calibration System: FP + Empirical

Dual-Component Architecture

The Expert is the only X-MET 8000 model supporting **automatic selection of empirical calibrations** built on Certified Reference Materials (CRM).

Fundamental Parameters (FP):

- Universal applicability across any matrix
- No grade-specific calibration required
- Fast preliminary results

Empirical Calibrations:

- Superior accuracy for standard alloy types
- Traceability to national standards (NIST, BAM, etc.)
- Automatic selection of optimal calibration post-grade identification

Alloy Library Coverage

- Stainless steels: AISI 300 series, 400 series, duplex, superduplex
- Tool steels: All major grades
- Aluminium alloys: 1xxx through 7xxx series
- Nickel alloys: Inconel, Incoloy, Monel, Hastelloy
- Titanium alloys: All commercial grades
- Cobalt alloys: Stellite and equivalents

- Copper alloys: Brass, bronze, Cu-Ni
- Zirconium alloys
- Lead and tin alloys
- Precious metal alloys

---

6. Display, Camera, and Interface

Parameter	Specification
Screen	4.3" Blanview sunlight-readable touchscreen
Resolution	480 x 800 px
Glove operation	Yes
Languages	13

Integrated camera (standard):

- Resolution: 640 x 480 px
- Magnification: 6x
- Field of view: ~7.5 x 6 mm
- Technology: CMOS

The camera is standard equipment on the Expert, not an option. This reflects the instrument's positioning toward professional applications where precise positioning is critical.

Optional small-spot collimator:

- Analysis spot: 3 mm diameter
- For isolated analysis of small parts, welds, and fasteners
- Camera-required for visual spot alignment

---

7. Power System

Parameter	Specification
Battery type	Li-Ion, 6.2 Ah
Batteries supplied	2
Operating time	10–12 hours
Charger	110/230 V, 50/60 Hz (universal adapters)
Charge time	~8 hours

---

8. Data Management

Parameter	Specification
Internal storage	16 GB
Result capacity	100,000+ with spectra and images
Export formats	CSV, tamper-proof PDF

Export channels: USB flash, Wi-Fi (PC/network), Bluetooth, ExTOPE Connect cloud

Reporting:

- CSV — for LIMS and Excel integration
- Tamper-proof PDF — for regulatory audits and arbitration documentation
- Report Generator — branded report creation with company logo, sample images, spectra, and results tables

---

9. Connectivity

Interface	Specification
USB	2.0
Bluetooth	2.0 + EDR (printers, scanners)
Wi-Fi	802.11 b/g (network, cloud, remote)
GPS	Optional (3.0 m CEP accuracy)

---

10. Radiation Safety and Compliance

- Password-protected activation
- Infrared proximity sensor — automatic tube shutdown on retraction
- Count-rate monitor — emergency cutoff
- Visual warning indicators
- Fail-safe mechanism — guaranteed shutdown on power/control failure
- Certifications: **CE, CB**

---

11. Standard Delivery Scope

1. X-MET 8000 Expert analyser with integrated camera
2. SS316 stainless steel check sample
3. Universal battery charger
4. Li-Ion batteries — 2 pcs.
5. USB cable
6. USB flash drive with documentation (13 languages)
7. Benchtop stand with radiation shield
8. Light radiation shield
9. Background plate

10. Holster and belt
11. Shoulder / neck strap
12. Wrist strap
13. TüV-tested carry case
14. Warranty card

---

12. Application Fit Matrix

Application	Fit	Notes
Critical PMI — nuclear, petrochemical, aerospace	Excellent	Maximum confidence mandated by industry codes
Grade separation — 303/304, 316/316L	Excellent	S and trace-level discrimination
Duplex/superduplex steel verification	Excellent	N, Cr, Mo, Ni quantification
Trace analysis (<0.01%)	Excellent	CRM calibrations deliver lowest detection limits
Arbitration and expert witness	Excellent	CRM traceability supports legal proceedings
Hot sample analysis (100–400°C)	Excellent (with HERO™)	No process shutdown required
General scrap sorting	Excellent	Over-specified but fully capable
Geochemical / soil analysis	Not recommended	See Expert Geo for dedicated geochemistry

---

13. Positioning Within the X-MET 8000 Series

Feature	Smart	Optimum	Expert
Tube voltage	40 kV	40/50 kV	50 kV
Filter wheel	Single	6-position	6-position
Light elements	No	Yes	Yes
CRM empirical calibrations	No	No	Yes
Camera	Optional	Optional	Standard
3 mm collimator	No	Optional	Optional
Hot samples (400°C)	No	Optional	Optional

Expert vs. Optimum — The Decision Point

Scenario	Optimum	Expert
Standard PMI (90% of workflows)	Sufficient	Over-specified
Trace analysis (<0.01%)	Limited	Optimal
303 vs 304 (S determination)	Marginal	Reliable
Nuclear / petrochemical critical	Risk-adjacent	Recommended
Camera required continuously	Extra cost	Included
Regulatory / legal defensibility	Moderate	Maximum

About the Author

Jacek Nowak — senior analytical solutions consultant specialising in industrial materials control and non-destructive verification across energy, aerospace, and heavy manufacturing sectors.

- RU: https://metal-asia.pw/authors/yatsek-novak
- EN: https://metal-asia.pw/en/authors/yatsek-novak

Specifications are based on Hitachi High-Tech Analytical Science official documentation. Parameters may vary by hardware revision. Confirm current specifications at time of order.