

PROJECT ASSURE
DIAMOND VERIFICATION INSTRUMENT STANDARD
TEST RESULTS

Assessment Report for: AMSMicro™



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Testing ID Number: **Category 3-3**
Report Date: **24-03-2025**
Approved by: **Didier Backaert**

Didier Backaert
Lab Manager

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	De Beers AMSMicro		
	Date:	24-03-2025	Testing ID: Category 3-3

DIAMOND VERIFICATION INSTRUMENT

Manufacturer's Name: AMSmicro
Instrument Model: 3708
Serial Number: AMSMICRO-08
Software Version: 4.1.2230.148
Lab Manager: Didier Backaert
Analyst/Operator: Violet Moradhaseli

Manufacturer stated diamond verification instrument description and features (AMSMicro Manual):

The AMSMicro:

- Is an automated screening device intended for use in all locations where polished stones are handled and which meet the Specifications outlined below;

Physical Specifications

Environmental	
Operating Altitude	2000 meters maximum
Temperature Range (Operating)	Indoors* 15 °C to 28 °C
Temperature (Storage)	Indoors* 0 °C to 70 °C
Humidity	Indoors* 45% to 65% non-condensing
Pollution	Pollution Degree 2
Over Voltage Category	2
IP Rating	IPX0
Electrical	
Rated Voltage	220-240 VAC ± 10% 50/60 Hz single phase
Rated Current	2.5 Amp
Rated Power	600 Watt
Optical	
Laser Source	Class 4 440nm ± 5nm 600mW
UV Source	60W Filtered Broadband Source
Enclosure Classification	Class 1
Mechanical	
AMSMicro Weight	264 kg
Shipping Weight	357 kg
DIMENSIONS	
• Length	920 mm
• Width	800 mm
• Height	1700 mm

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* AMSMicro is unsuitable for use or storage in outdoor conditions or any environment which exposes it to wet or cold environments

- Is designed to automatically feed, measure, and dispense small, round brilliant, polished stones to discriminate natural diamond from lab grown diamond and diamond simulants.
 - Is intended only for use with colourless or near-colourless diamonds.
 - Is designed to screen a maximum parcel size of 200ct¹.
 - Is not intended for use in the classification of other precious gems or diamond simulants, nor to detect the treatment of natural diamonds e.g. fracture filling, irradiation, or heat-treatments.
 - The user shall ensure that the AMSMicro is only used to test parcels of stones which are: Colourless or near colourless.
 - Cleaned (acid or otherwise) prior to screening to give efficient rates of processing and to prevent grease and electrostatic charge causing the stones to adhere to each other or to surfaces within the machine.
 - Stones adhering to each other or to surfaces within the machine will not be processed correctly.
 - Round brilliant cut only.
 - Have a girdle diameter between 0.60mm (approx. 0.001ct) and 0.99mm (approx. 0.0033ct).
 - AMSMicro splits this overall size range into a number of narrower ranges including, but not limited to: 0.6mm to 0.69mm; 0.7mm to 0.79mm; 0.8mm to 0.85mm and 0.9mm to 0.99mm. Each parcel to be screened using AMSMicro shall fall within one of these size ranges².
 - have a maximum diameter variation between stones of 0.05mm.
- Stones outside this range or cut will not be correctly handled and may damage AMSMicro and/or the stones. Stones which fall outside the above stated size limits and cut may not be retrievable from the AMSMicro. It is also likely that stones below the stated minimum size may not be correctly contained within the AMSMicro.
- Sieved to ensure that they are within the Specifications of Use in this section and that no debris or other foreign material is present.

¹ Smaller parcels may be more efficient in terms of working practice, however.

² Sieving is an efficient way to ensure that the stones to be screened are accurately sized.

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INSTRUMENT PERFORMANCE ASSESSMENT

ASSESSMENT CRITERIA

The ASSURE testing methodology and performance metrics are dependent on the operational capabilities of the diamond verification instrument being tested. These are defined by the following three categories:

Category 1- Screen diamonds from synthetic diamonds. This category of device is intended for discrimination of diamonds from synthetic diamonds. It cannot distinguish diamonds from diamond simulants and therefore requires stones to be pre-screened to ensure no simulants are introduced into the device.

Category 2 – Screen diamonds from synthetic diamonds and diamond simulants. This category of device is intended for discrimination of diamonds from synthetic diamonds and diamond simulants. This device cannot distinguish synthetic diamonds from diamond simulants.

Category 3 – Screen diamond from synthetic diamonds from diamond simulants. This category of device is intended for discrimination of diamonds, synthetic diamonds and diamond simulants from each other. This device can distinguish synthetic diamonds from diamond simulants.

Instrument performance for classifying the different kinds of stones was assessed against:

- ☐ Diamond Verification Instrument Standard Part 1 – Diamond Verification Instrument for Screening Diamonds from Synthetic Diamonds (18 03 2024)
- ☐ Diamond Verification Instrument Standard Part 2 – Diamond Verification Instrument for Screening Diamonds from Synthetic Diamonds and Diamond Simulants (18 03 2024)
- ☒ Diamond Verification Instrument Standard Part 3 – Diamond Verification Instrument for Screening Diamonds, Synthetic Diamonds, and Diamond Simulants (18 03 2024)

as referenced in sections 7.3 and 7.4 of the Diamond Verification Instrument Standard – General Requirements for Evaluation Diamond Verification Instruments (18 03 2024). Any deviations from the Standard are noted below:

Notes:

The AMSMicro was not capable of screening synthetic sapphire. The Diamond Simulant sample set used for testing was comprised of Moissanite and Cubic Zirconium stones.

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DEFINITIONS

Diamond Accuracy	<i>Diamond</i> test stones correctly classified as <i>Diamond</i> .
Synthetic Diamond Accuracy	<i>Synthetic Diamond</i> test stones correctly classified as <i>Synthetic Diamond</i> .
Diamond Simulant Accuracy	<i>Diamond Simulant</i> test stones correctly classified as <i>Diamond Simulant</i> .
Diamond Referral Rate	<i>Diamond</i> test stones classified as <i>Referral</i> .
Synthetic Diamond Referral Rate	<i>Synthetic diamond</i> test stones classified as <i>Referral</i>
Simulant Referral Rate	<i>Diamond simulant</i> test stones classified as <i>Referral</i>
Diamond False Positive Rate	Synthetic diamonds /diamond simulants test stones incorrectly classified as <i>Diamond</i> .
Synthetic Diamond False Positive Rate	Diamonds/ <i>Diamond simulants</i> test stones incorrectly classified as Synthetic Diamond.
Diamond Simulant False Positive Rate	Diamonds /Synthetic Diamonds test stones incorrectly classified as Diamond Simulants.
Diamond False Negative Rate	Diamonds test stones incorrectly classified as Synthetic Diamonds or Diamond simulants.
Synthetic Diamond False Negative Rate	Synthetic Diamonds test stones incorrectly classified as Diamonds or Diamond simulants
Diamond Simulant False Negative Rate	Diamond Simulant test stones incorrectly classified as Diamonds or Synthetic Diamonds
Testing Speed	The average speed at which the diamond verification instrument evaluates the stones in the PRIMARY loose sample set, including set-up time (if any)
Operating Speed	For auto-loading diamond verification instruments only the average speed at which stones are evaluated once the instrument achieves a steady-state does not include set-up time.

TEST STONE SETS USED FOR EVALUATION

Loose, Polished Stone Test Sets	Diamond	Synthetic Diamond	Diamond Simulant
Primary Sample Set (>2.0 mm, D-J color)	☐	☐	☐
Supplementary Smalls Sample Set (1.0-2.0 mm, D-J color)	☐	☐	☐
Supplementary Ultra Smalls Sample Set (0.5-1.0mm, D-J color)	☒	☒	☒
Mounted, Polished Stone Test Sets	Diamond	Synthetic Diamond	Diamond Simulant
Primary Sample Set (>2.0 mm, D-J color)	☐	☐	☐
Supplementary Smalls Sample Set (1.0-2.0 mm, D-J color)	☐	☐	

Notes: Ultra Smalls Sample Set for testing was comprised of diamond, synthetic diamond (HPHT and CVD), cubic zirconium and moissanite with size ranging from 0.6mm to 1.0mm in diameter.

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CLEANING PROCEDURE OF STONES PRIOR TO TESTING

Test stones sets are cleaned in an ultrasonic bath of isopropanol for 2 minutes and dried prior to testing to reduce grease and electrostatic charge, as per Section 8 of ASSURE Standard.

LABORATORY CONDITIONS AT TIME OF ASSESSMENT

Condition	Requirement	Actual
Temperature (°C)	18 to 25°C	24 °C
Humidity (%)	50 to 65%	54 %

RESULTS OF INSTRUMENT PERFORMANCE ASSESSMENT – LOOSE STONES

Performance Metric	Ultra-Small [1]
Diamond accuracy (%)	97.7%
Synthetic diamond accuracy (%)	67.0%
Diamond simulant accuracy (%)	97.0%
Diamond referral rate (%)	2.3%
Synthetic diamond referral rate (%)	33.0%
Diamond simulant referral rate (%)	3.0%
Diamond false positive rate (%)	0.0%
Synthetic diamond false positive rate (%)	0.0%
Diamond simulant false positive rate (%)	0.0%
Diamond false negative rate (%)	0.0%
Synthetic diamond false negative rate (%)	0.0%
Diamond simulant false negative rate (%)	0.0%

Notes:

^[1] Ultra Smalls sample set is comprised of stones of diameter 0.6mm to 1.0mm.

INSTRUMENT TESTING SPEED ASSESSMENT

Testing Speed approximates the usage turnaround time that could be expected by a novice user of the diamond verification instrument and is determined by the time required to evaluate the performance of the diamond verification instrument on the Primary Loose stone test set:

- Testing Speed accounts for the time directly associated with stone assessment including loading stones, programming any applicable instrument measurement parameters, analyzing the stones, and segregating the analyzed stones into respective instrument classified groups.
- Testing Speed does not include the time to initially warm-up the diamond verification instrument (if applicable) nor the time to separate diamonds from synthetic diamonds for each of the instrument classified groups of analyzed stones.
- Testing Speed does not include time associated with interruptions to the testing process.

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Diamond verification instruments that continuously load and analyze stones (i.e., autoloading diamond verification instruments) shall also be assessed for a steady-state Instrument Operating Speed.

Testing speed, and instrument operating speed if applicable, are measured in triplicate. The mean value is reported in the Speed

SPEED TEST RESULTS (PRIMARY LOOSE SAMPLE)

Category	Stones per hour	Uncertainty
Testing Speed (all devices)	2,630	N/A
Operating Speed (auto-loading devices)	3,200	N/A

Notes: none

ADDITIONAL FINDINGS

***** End of Report *****