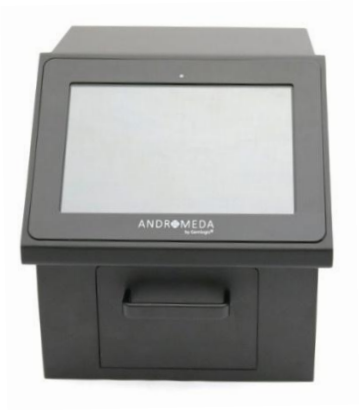
NATURAL DIAMOND COUNCIL

Universiteit Antwerpen

PROJECT ASSURE
DIAMOND VERIFICATION INSTRUMENT STANDARD
TEST RESULTS

Assessment Report for: Jubilee Diamond Instruments (Gemlogis) / Lumens



Prepared For: Luc Auer
Natural Diamond Council Belgium VOF
Hoveniersstraat 22
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Testing ID Number: 2024-06
Report Date: Feb 25, 2025 .
Approved by:

Quinten Van Avondt
Lab Manager

DIAMOND VERIFICATION INSTRUMENT

Manufacturer's Name: Jubilee Diamond Instruments
Instrument Model: Lumens (GEM-0024-01)
Serial Number: S/N: 242352001A
Software Version: not applicable
Lab Manager: Quinten Van Avondt
Analyst /Operator: Cindy De Plukker

Manufacturer stated diamond verification instrument description and features:

- Manual stone feed
- User interpretation (Natural, CVD, HPHT or Cubic Zirconia)
- Manual stone sorting

Manufacturer stated diamond verification instrument limitations:

- Loose stones (maximum 20 stones at the same time)
- Mounted ring and jewelry (no closed-back jewelry)
- No stone size limit
- Stone color D-K

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.

Universiteit Antwerpen	Jubilee Diamond Instruments / Lumens			
	Date:	February 25, 2025	Testing ID:	2024-06

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:

Lumens is capable of screening cubic zirconia, as per manufacturer. This was not part of ASSURE 2.0 testing since Lumens cannot screen moissanite, glass and sapphire with are also included in the ASSURE 2.0 diamond simulant sample sets.

DEFINITIONS:

Diamond Accuracy	Diamond test stones correctly classified as Diamond.
Synthetic Diamond Accuracy	Synthetic Diamond test stones correctly classified as Synthetic Diamond.
Diamond Referral Rate	Diamond test stones classified as Referral.
Synthetic Diamond Referral Rate	Synthetic diamond test stones classified as Referral
Diamond False Positive Rate	Synthetic Diamond / Diamond Simulant test stones incorrectly classified as Diamonds.
Synthetic Diamond False Positive Rate	Diamond / Diamond Simulant test stones incorrectly classified as Synthetic Diamonds
Diamond False Negative Rate	Diamonds incorrectly classified as Synthetic Diamonds or Diamond Simulants
Synthetic Diamond False Negative Rate	Fraction of S*ynthetic Diamonds* incorrectly classified as *Diamond.*
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.

Universiteit Antwerpen	Jubilee Diamond Instruments / Lumens			
	Date:	February 25, 2025	Testing ID:	2024-06

TEST STONE SETS USED FOR EVALUATION

Loose, Polished Stone Test Sets	Diamond	Synthetic Diamond
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 (0.5mm - < 1.0 mm) (for automated devices only)	☐	☐
Mounted, Polished Stone Test Sets	**Diamond**	**Synthetic Diamond**
Primary Sample Set (>2.0 mm, D-J color)	☒	☒
Supplementary Smalls Sample Set (1.0-2.0 mm, D-J color)	☐	☐

Notes:

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	23 °C
Humidity (%)	50 to 65%	57 %

RESULTS OF INSTRUMENT PERFORMANCE ASSESSMENT – LOOSE STONES

Performance Metric	Primary	Uncertainty[1]	Smalls	Uncertainty[1]
Diamond accuracy (%)	98.4	0.4	97.0	0.6
Synthetic diamond accuracy (%)	95.3	1.0	94.3	0.8
Diamond referral rate (%)	n/a[2]	n/a[2]	n/a[2]	n/a[2]
Synthetic diamond referral rate (%)	n/a[2]	n/a[2]	n/a[2]	n/a[2]
Diamond false positive rate (%)	4.7	1.0	5.7	0.8
Synthetic diamond false positive rate (%)	1.6	0.4	3.0	0.6
Diamond false negative rate (%)	1.6	0.4	3.0	0.6
Synthetic diamond false negative rate (%)	4.7	2.5	5.7	0.8

Notes: [1] Uncertainty is expressed as absolute +/- range and reflects the consistency of the instrument's classification of stones for each of the three trials performed with the ASSURE sample.

[2] No stones are referred for this device

RESULTS OF INSTRUMENT PERFORMANCE ASSESSMENT – MOUNTED STONES

Performance metric	Primary
Diamond accuracy (%)	100.0
Synthetic diamond accuracy (%)	97.8
Diamond referral rate (%)	n/a[1]
Synthetic diamond referral rate (%)	n/a[1]
Diamond false positive rate (%)	2.2
Synthetic diamond false positive rate (%)	0.0
Diamond false negative rate (%)	0.0
Synthetic diamond false negative rate (%)	2.2

Notes: [1] No stones are referred for this device
Closed-back jewelry was not tested.

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.

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 Test Results table below. The Uncertainty reflects the absolute +/- range of the results measured over the three trials.

Universiteit Antwerpen	Jubilee Diamond Instruments / Lumens			
	Date:	February 25, 2025	Testing ID:	2024-06

SPEED TEST RESULTS (PRIMARY LOOSE SAMPLE)

Category	Stones per hour	Uncertainty
Testing Speed (all devices)	199	21
Operating Speed (auto-loading devices)	n/a[1]	n/a[1]

Notes: [1] not applicable for this device , the device has manual feed

ADDITIONAL FINDINGS

None

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