NATURAL DIAMOND COUNCIL

Universiteit Antwerpen

PROJECT ASSURE
DIAMOND VERIFICATION INSTRUMENT STANDARD
TEST RESULTS

Assessment Report for: Yehuda Diamond Company / Sherlock Holmes 4.0

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Approved by:

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DIAMOND VERIFICATION INSTRUMENT

Manufacturer's Name: Yehuda
Instrument Model: Sherlock Holmes 4.0
Serial Number: S/N 20-201860
Software Version: version 2.6.5
Lab Manager: Quinten Van Avondt
Analyst /Operator: Cindy De Plukker

Manufacturer stated diamond verification instrument description and features:

- Manual stone feed
- User interpretation (natural or synthetic)
- Single and multiple stone testing
- Results: natural or synthetic
- Distinguishes natural diamonds from synthetic diamonds

Manufacturer stated diamond verification instrument capabilities:

- Loose stones and mounted stones
- Any stone shape
- Stone size up to any size melee
- D-K color range

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:

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☒ 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:

Although the manual states that moissanite and cubic zirconium can be tested, simulants were left out of the ASSURE sample set since instrument cannot test corundum (sapphire) or glass. Instrument performance was assessed against Test Standard Part 1.

DEFINITIONS:

Diamond Accuracy	*Diamond* test stones correctly classified as *Diamond*.
Synthetic Diamond Accuracy	*Synthetic Diamond* test stones correctly classified *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* test stones incorrectly classified as *Diamond*.
Synthetic Diamond False Positive Rate	*Diamond* test stones incorrectly classified as *Synthetic Diamond*
Diamond False Negative Rate	*Diamond* test stones incorrectly classified as *Synthetic Diamond*
Synthetic Diamond False Negative Rate	*Diamond* test stones 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.

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 (0.5 mm - < 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: none

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.

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LABORATORY CONDITIONS AT TIME OF ASSESSMENT

Condition	Requirement	Actual
Temperature (°C)	18 to 25°C	24 °C
Humidity (%)	50 to 65%	57 %

RESULTS OF INSTRUMENT PERFORMANCE ASSESSMENT – LOOSE STONES

Performance Metric	Primary	Uncertainty[1]	Smalls	Uncertainty[1]
Diamond accuracy (%)	97.2	0.1	92.6	0.9
Synthetic diamond accuracy (%)	100.0	0.0	100.0	0.0
Diamond referral rate (%)	0.0[2]	0.0[2]	0.0[2]	0.0[2]
Synthetic diamond referral rate (%)	0.0[2]	0.0[2]	0.0[2]	0.0[2]
Diamond false positive rate (%)	0.0	0.0	0.0	0.0
Synthetic diamond false positive rate (%)	2.8	0.1	7.4	0.9
Diamond false negative rate (%)	2.8	0.1	7.4	0.9
Synthetic diamond false negative rate (%)	0.0	0.0	0.0	0.0

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] There is no Referral category for this device. Each stone was interpreted as either Diamond or Synthetic Diamond.

RESULTS OF INSTRUMENT PERFORMANCE ASSESSMENT – MOUNTED STONES

Performance metric	Primary	Small
Diamond accuracy (%)	100.0	100.0
Synthetic diamond accuracy (%)	100.0	100.0
Diamond referral rate (%)	0.0[1]	0.0[1]
Synthetic diamond referral rate (%)	0.0[1]	0.0[1]
Diamond false positive rate (%)	0.0	0.0
Synthetic diamond false positive rate (%)	0.0	0.0
Diamond false negative rate (%)	0.0	0.0
Synthetic diamond false negative rate (%)	0.0	0.0

Notes: [1] There is no Referral category for this device. Each stone was interpreted as either Diamond or Synthetic Diamond.

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. Uncertainty reflects the absolute +/- range of the results measured over the three trials.

SPEED TEST RESULTS (PRIMARY LOOSE SAMPLE)

Category	Stones per hour	Uncertainty
Testing Speed (all devices)	109	18
Operating Speed (auto-loading devices)	n/a[1]	n/a[1]

Notes: [1] not applicable (n/a) for this device since the device has manual feed
Manual feed was done using the supplied 12 slot tray.

ADDITIONAL FINDINGS

- Sherlock Holmes 4.0 requires use of a recent model iOS or Android smart phone (not included). Yehuda recommends an iPhone not older than 3 years. ASSURE testing was done using an iPhone 15.
- Device requires installation of the Yehuda app on the smart phone, with a subscription cost of $10 per month.
- Prior to testing, the phone must be color-calibrated using a selection of sample stones of known origin since colors may appear differently from phone to phone. Sample stones are not included.
- Care must be taken when positioning the phone on top of the instrument to ensure ambient light is fully blocked from the sides.
- For more challenging stones it may be necessary to view the stone from multiple angles at maximum zoom.

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