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Standard for Examination of Handwritten Items



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Foreword

The procedures outlined here are grounded in the generally used body of knowledge and experience in the field of forensic document examination.

The American Academy of Forensic Sciences established the Academy Standards Board (ASB) in 2015 with a vision of safeguarding Justice, Integrity and Fairness through Consensus Based American National Standards. To that end, the ASB develops consensus based forensic standards within a framework accredited by the American National Standards Institute (ANSI), and provides training to support those standards. ASB values integrity, scientific rigor, openness, due process, collaboration, excellence, diversity and inclusion. ASB is dedicated to developing and making freely accessible the highest quality documentary forensic science consensus Standards, Guidelines, Best Practices, and Technical Reports in a wide range of forensic science disciplines as a service to forensic practitioners and the legal system.

This document was revised, prepared, and finalized as a standard by the Forensic Document Examination Consensus Body of the AAFS Standards Board (ASB). It was originally developed by the Scientific Working Group on Forensic Document Examination (SWGDOC). That document was updated by the Forensic Document Examination Committee under the Organization of Scientific Area Committees (OSAC) for Forensic Science, who in turn updated and approved the draft document.

Questions, comments, and suggestions for the improvement of this document can be sent to AAFS-ASB Secretariat, ash@aafs.org or 401 N 21st Street, Colorado Springs, CO 80904.

All hyperlinks and web addresses shown in this document are current as of the publication date of this standard.

ASB procedures are publicly available, free of cost, at www.aafs.org/academy-standards-board.

Keywords: *handwriting, forensic document examination.*

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Standard for Examination of Handwritten Items

1 Scope

This standard provides procedures used by forensic document examiners for examinations and comparisons involving handwritten items. These procedures apply to the examination and comparison of questioned and known items or of exclusively questioned items. The procedures in this standard include evaluation of the sufficiency of the material (questioned, or known, or both) available for examination.

The particular methods employed in a given case depend upon the nature of the material available for examination. This standard might not cover all aspects of unusual or uncommon examinations of handwritten items.

This standard cannot replace the requisite knowledge, skills, or abilities acquired through task-specific education, training, research, and experience.

2 Normative References

There are no normative reference documents. Annex A, Bibliography, contains informative references.

3 Terms and Definitions

Refer to Section 3 of the *SWGDOC Standard for Examination of Handwritten Items*^a and Section 3 of the *SWGDOC Standard Terminology Relating to the Examination of Questioned Documents*^b.

4 Technical Discussion

4.1 Significance and Use

The procedures outlined in Section 6 are grounded in the generally used body of knowledge and experience in the field of forensic document examination. These procedures shall be used by a forensic document examiner trained in the procedures and instruments described in this document.

4.2 Interferences

Items submitted for examination may have inherent limitations that can interfere with the procedures in this standard. Limitations should be noted and recorded.

4.2.1 Limitations can be due to such factors as the submission of non-original documents, the condition of the items submitted for examination, the quantity, complexity, or comparability of the writing submitted, alphabet, language, or absent or insufficient characteristics. Such features are taken into account in this standard. The effects of prior storage, handling, testing, or chemical

^a Available from: <http://www.swgdoc.org/documents/SWGDOC%20Standard%20for%20Examination%20of%20Handwritten%20Items.pdf>

^b Available from: <http://www.swgdoc.org/documents/SWGDOC%20Standard%20Terminology%20Relating%20to%20the%20Examination%20of%20Questioned%20Documents.pdf>

processing (for example, for latent prints) can interfere with the ability of the examiner to see certain characteristics, or can eradicate writing entirely. Whenever possible, document examinations should be conducted prior to any chemical processing. Items should be handled to avoid compromising subsequent examinations.

Caution should be exercised when evaluating quantity and comparability of known materials collected by a stakeholder. Stakeholder selected specimens may not reflect a writer's full range of variation.

4.2.2 Limitations can be due to unnaturalness of any writings.

Consideration shall be given to the various forms of simulations, imitations, and duplications of handwriting that can be generated by computer and other means.

The drawn nature of many handwritten simulations and tracings can limit their comparability with known writing. It is not always possible to differentiate between handwritten simulations and tracings.

Distorted writing can appear similar to some forms of simulation or tracing, or may be the product of other intrinsic or extrinsic factors.

5 Equipment and Requirements

5.1 The items in 5.2 through 5.6 are required for forensic document examination of handwritten items. Their use is case specific.

5.2 Light source(s) of intensity and appropriate type to allow fine detail to be distinguished shall be used. Light sources include those capable of producing transmitted lighting, oblique lighting, vertical incident lighting, and other alternative lighting and filters.

5.3 The examiner shall use necessary magnification that allows pertinent fine detail to be distinguished. Magnification may include low power hand lenses but may require higher magnification such as a stereomicroscope, or digital microscope, with a range of magnification.

5.4 Photographic or other imaging equipment for recording observations shall be available. This may include: image capture device(s) capable of resolution to reliably record pertinent details; image output device(s) (for display or hardcopy production) capable of resolution and color balance for the intended purpose(s), and; media and appropriate systems for intermediate storage and archiving of images.

5.5 The examiner should utilize other apparatus and software as appropriate.

5.6 There shall be adequate time and facilities to complete all applicable procedures.

6 Procedure

6.1 General

The examiner shall not treat, handle, alter, or mark a document in any way that will affect the examination integrity of the document.

If permission is granted or required by the laboratory to label the document sets, it shall be done in a manner that does not affect the examination integrity of the document.

The examiner shall contemporaneously document the examinations performed, relevant observations, and basis for results, in detail to allow for an internal or external review and assessment of the utilized examination processes by a forensic document examiner. The documentation shall include any relevant information, method(s), interpretation(s), evaluation(s), and conclusion(s), opinion(s), or other finding(s).

At various points in these procedures, a determination that an important character or feature is not present or that an item is lacking in quality, quantity, or comparability can indicate that the examiner should discontinue or limit the procedure(s). It is at the discretion of the examiner to discontinue the procedure at that point and report accordingly or to continue with the applicable procedures to the extent possible. The examiner shall document the reason(s) for such a decision.

NOTE Although there is some support within forensic disciplines for the evaluation and documentation of the questioned material prior to the evaluation of the known material, there are currently limited studies specific to handwriting examinations that support requiring the evaluation of the questioned material first.

6.2 Scope of Examination

6.2.1 The examiner shall perform and document all applicable procedures in sections 6.2.2 through 6.2.6. These procedures need not be performed in the order given. Deviations from these procedures shall be documented and justified.

6.2.2 The examiner shall determine whether the examination is a comparison of questioned writing to known writing or a comparison of questioned writing to questioned writing.

6.2.3 If the scope of the examinations to be undertaken is not clear based upon submission materials or communication(s) with the submitter, the examiner shall endeavor to clarify the examination(s) to be undertaken or question(s) to be evaluated.

6.2.4 The examiner shall document the scope of the examinations and comparisons. The scope can be as simple as a statement of the initial relevant question(s) to be answered.

NOTE The scope may be written as two or more mutually exclusive competing hypotheses and propositions for each set of comparisons. There are typically two competing hypotheses for each set of comparisons; however, sub-hypotheses may also arise.

Commonly encountered hypotheses which, when mutually exclusive, may be combined as competing hypotheses for evaluation, include:

- a) the questioned material was written by the writer of the known material;
- b) the questioned material was written by a random and unspecified writer in a relevant alternative population;
- c) the questioned material was written by another specified writer;
- d) the questioned material was written by the writer of the known material in a distorted manner.

6.2.5 The examiner shall analyze the submitted item(s) to determine sufficiency relative to the scope.

6.2.6 The examiner shall consider factors that might affect the writing (i.e., unnatural writing, simulation, tracing, reproduction). The examiner may consider information regarding intrinsic or extrinsic factors that might affect the writing.

6.2.7 The examiner shall endeavor to avoid exposure to potentially biasing information that is not necessary for evaluation purposes within the examination process.

6.2.8 If modification of the original scope is appropriate during the examination (6.3 through 6.6), the examiner shall document the reason and restate the scope. If modifications are made to the scope, the examiner shall reconsider aspects of 6.2.

6.3 Examination of the Questioned Writing

6.3.1 The examiner shall perform and document all applicable procedures in sections 6.3.2 through 6.3.10. These procedures need not be performed in the order given. Deviations from these procedures shall be documented and justified.

6.3.2 The examiner shall determine whether the questioned writing is original writing. If it is not original writing, request the original.

If the original questioned writing is not submitted, the examiner shall evaluate the quality of the submitted reproduction to determine whether the significant details of the writing have been reproduced with sufficient clarity for analysis and comparison purposes and proceed to the extent possible. The degree of limitation will vary depending upon the specifics of the case. If the writing has not been reproduced with sufficient clarity for meaningful analysis or comparison purposes, the examiner shall discontinue these procedures and report accordingly.

NOTE The absence of original writing does not preclude the examinations in this standard; however, examination of the original writing is preferable. Limitations associated with reproductions can include the inability to detect: guide lines; writing instrument type; direction of stroke; pressure; sequence of strokes; hesitations and stops; indentations; erasures; line quality; and artifacts of cut and paste alterations. The extent of these limitations may vary greatly.

6.3.3 The examiner shall examine the questioned writing for characteristics of duplication, such as those of cut and paste manipulation, by electronic or other means.

6.3.4 The examiner shall evaluate the questioned writing for the following.

- a) *Type of Writing*—If there is more than one type of writing (hand printing, cursive writing, numerals, symbols, or combinations thereof, and signatures) within the questioned writing, separate the questioned writing into groups of single types of writing.
- b) *Internal Consistency*—If there are inconsistencies within any one of the groups created in a) (for example, suggestive of multiple writers), divide the group(s) into consistent sub-groups.
- c) *Complexity*—Assess the perceived ease or difficulty with which the questioned writing could be simulated by another writer for purposes of determining the suitability of the questioned writing for comparison purposes. Factors to be considered include speed, skill, style, construction, changes of directions, retracings, pen lifts, level of stylization, and degree of repetitive movements or shapes. This includes the examiner's assessment of overall rarity or generic nature of the characteristics.

Proceed to [6.3.5](#) for the questioned writing. If it is sub-divided, proceed for each group or subgroup created.

6.3.5 The examiner shall perform an analysis of the questioned writing.

NOTE Among the features to be considered are elements of the writing such as: abbreviation; alignment; arrangement, formatting, and positioning; capitalization; connectedness and disconnectedness; cross strokes and dots, diacritics and punctuation; direction of strokes; distortion; embellishments; formation; freedom of execution; inconsistencies; legibility; line quality; method of production; pen hold and pen position; overall pressure and patterns of pressure emphasis; proportion; simplification; sister lines; size; skill; slant or slope; spacing; speed; initial, connecting, and terminal strokes; system; tremor; type of writing; and range of variation, both overall and with respect to each of the above features/elements.

6.3.6 The examiner shall examine the questioned writing for characteristics indicative of speed of execution.

NOTE Features that may indicate rapid execution include: varied pen pressure; tapered beginning and ending strokes; and smooth, continuous strokes. Features that may indicate slow execution include: lifts, stops, and hesitations of the writing instrument; patching and retouching; slow, drawn quality of the line; unvaried pressure; and unnatural tremor.

6.3.7 The examiner shall determine whether the questioned writing appears to be distorted.

NOTE Distortion can be attributable to internal or external factors and can be intentional. Features that may indicate distortion include: poor line quality; excessive angularity; unusual overall size; tremor; and wide variation in slant, shapes, spacing, and size.

6.3.8 The examiner shall examine the questioned writing for indicia of simulation and tracing. Consideration shall be given to the following:

- if characteristics of slow execution are observed, determine whether these characteristics are specifically indicative of an attempt to simulate or to trace;

NOTE Some handwritten simulations and tracings might not display significant characteristics of slow execution (for example, practiced freehand simulations). Simulations and tracings executed in a rapid manner can reflect the preparer's individual writing habits.

- whether guide lines or sister lines are present;
- whether, including the above factors, there is an unnatural similarity between multiple questioned items;
- if indicia of simulation or tracing are found, see [6.5.6](#) through [6.5.6.1](#).

6.3.9 The examiner shall consider additional features such as date, nature of the substrate, writing instrument, document type, margins, and the area available for writing.

6.3.10 If the examination is a comparison of exclusively questioned writing, go to [6.5](#).

6.4 Examination of the Known Writing

6.4.1 The examiner shall perform and document all applicable procedures in sections 6.4.2 through 6.4.7. These procedures need not be performed in the order given. Deviations from these procedures shall be documented and justified.

6.4.2 For known writing submitted, the examiner shall determine whether the known writing is original writing. If it is not original writing, the examiner may request the original. .

If no original known writing is submitted, the examiner shall evaluate the quality of the submitted reproduction to determine whether the significant details of the writing have been reproduced with sufficient clarity for analysis and comparison purposes and proceed to the extent possible. The degree of limitation will vary depending upon the specifics of the case. If both original and non-original known writings are submitted, the examiner shall evaluate the known writings as a group. If the writing has not been reproduced with sufficient clarity for any analysis or comparison purposes, and neither the original nor better copies are available, the examiner may discontinue these procedures and report accordingly.

NOTE The absence of original writing does not preclude the examinations in this standard; however, examination of the original writing is preferable. Limitations associated with reproductions can include the inability to detect: guide lines; writing instrument type; direction of stroke; pressure; sequence of strokes; hesitations and stops; indentations; erasures; line quality; and artifacts of cut and paste alterations. The extent of these limitations may vary greatly.

6.4.3 The examiner shall evaluate the known writing for the following.

- a) *Type of Writing*—If there is more than one type of writing (hand printing, cursive writing, numerals, symbols, or combinations thereof, and signatures) within the known writing, separate the known writing into groups of single types of writing.
- b) *Internal Consistency*—If there are unresolved inconsistencies within any of the groups created in 6.4.3 a) (for example, suggestive of multiple writers), contact the submitter for authentication. If any inconsistencies are not resolved to the examiner's satisfaction, discontinue these procedures for the affected group(s), and report accordingly.
- c) *Source of Specimens*— Known specimens may include both those written in the normal course of business and those that were written specifically at request for comparison purposes. Known specimens solely collected by a stakeholder may not reflect a writer's full range of variation.

Proceed to 6.4.4 for the known writing. If it is sub-divided, proceed for each group or subgroup created.

6.4.4 The examiner shall determine whether any of the known writing appears to be distorted. If it appears to be distorted, the examiner shall determine whether it is possible to establish that the distorted writing is natural writing.

If it is not possible to establish whether apparently distorted writing is natural writing, the examiner shall determine whether the writing is suitable for analysis and comparison and proceed to the extent possible. It should be determined whether additional known writing could be of assistance, and if so, it should be requested. If the available known writing is not suitable for any analysis or comparison, the examiner shall discontinue these procedures and report accordingly.

6.4.5 The examiner shall perform an analysis of the known writing (see Note in 6.3.5).

6.4.6 The examiner shall examine the known writing for characteristics indicative of speed of execution (see NOTE in 6.3.6).

6.4.7 The examiner shall consider additional features such as date, nature of the substrate, writing instrument, document type, margins, and the area available for writing.

6.5 Comparison of the Bodies of Writing (questioned writing to known writing or exclusively questioned writing)

6.5.1 The examiner shall perform and note all applicable procedures in sections 6.5.2 through 6.5.6.1. These procedures need not be performed in the order given. Deviations from these procedures shall be documented and justified.

6.5.2 The examiner shall evaluate the comparability of the bodies of writing.

6.5.2.1 Features limiting comparability may include the type of writing, non-contemporaneousness, dissimilarities in text content, capture methods, writing instruments, and writing surfaces. Consideration of factors in 6.5.4 shall be taken into account regardless of whether contemporary writings are available.

NOTE A lack of contemporaneous writings can hamper the assessment of characteristic dissimilarities. The consideration of the quality of any submitted known writings that are nearest in date to the item(s) in question may indicate if more contemporary writings are needed.

6.5.2.2 The evaluation of pictorial images from digitally captured signatures (DCS, also known as electronically captured signatures) generally follows the procedures outlined in this standard. However, the pictorial characteristics of such images may exhibit poor quality and distortion. The examination of the data utilized to create those signatures (i.e., X and Y position of the stylus tip, timing of execution, and exercised Force) may prove useful, but is beyond the scope of this document.

6.5.2.3 In questioned to questioned examinations, if the bodies of writing are not comparable, the examiner shall discontinue and report accordingly per laboratory policy. In questioned to known examinations, if the bodies of writing are not comparable, the examiner shall request additional known writing per laboratory policy.

6.5.2.4 If contemporaneous writings are requested but not obtained, continue as appropriate.

6.5.2.5 If additional known writing is made available, return to 6.4.

6.5.3 The examiner shall conduct a side-by-side comparison of comparable portions of the bodies of writing.

NOTE In some cases, when known writings are submitted from multiple writers, the volume of material may require a methodical assessment of characteristics for comparability, also known as screening. The screening process is used to denote certain significant characteristics that tend to be obvious, particularly uncommon, or in some other way may allow for comparisons of limited characteristics in a timely manner and may include questioned or known material. Once the screening process is complete, the selected items will be fully examined.

6.5.3.1 The examiner shall note absent characters relevant to the comparison.

6.5.3.2 The examiner shall evaluate the quantity and quality of writing (questioned writing, or known writing, or both) with respect to all of the characteristics (see Note in 6.3.5).

6.5.4 If distortion or affects were previously noted in the questioned or known writing, such distortion or affects shall be considered in the comparison process. Factors which might affect writing include age; illness or injury; medication, drugs or alcohol (intoxication or withdrawal); awkward writing position; writing instrument(s); substrate(s); cold or heat; fatigue; haste or carelessness; nervousness; nature of the document, use of the unaccustomed hand; attempts to disguise should be considered.

6.5.5 The examiner shall evaluate the significance of dissimilarities and similarities, individually and in combination, with respect to discriminating elements (see Note in 6.3.5.).

NOTE A dissimilarity is a feature within the questioned writing that is not found in any of the submitted known specimens. The presence of a feature, even in one specimen, constitutes evidence that the feature is within the repertoire of the writer and cannot be assessed as a dissimilarity. The assessment of a dissimilarity being evidence of a different source (writer) is in large part relative to the confidence level of the assessment that the provided handwriting specimens constitute a comprehensive sample of the writer's full range of variation as opposed to a feature that is not present within the specimen samples. This is a very high level of proof requiring extensive known specimens from multiple sources, over a large timeframe, and with a well-defined and well-established range of variation.

6.5.6 If indicia of simulation or tracing are noted in the examination of the questioned writing, the examiner shall determine whether the model(s) is among the submitted writings. The examiner shall individually evaluate the presence of unnatural pictorial similarities in order to determine whether the known writing was used as a model or if two or more questioned writings are simulations or tracings based on a common model. Overlay comparisons have been found to be an effective method of evaluation. If the model(s) is located among the submitted writings, report accordingly. If the model(s) is not located among the submitted writings, a request for additional materials may be appropriate.

NOTE Tracings can be produced by various techniques, including: direct tracing, where the model is placed behind the target and seen through the target by ambient light; transmitted light tracing, where the model is placed between the target and a light source; or guideline tracing, where an intermediate model, such as an indentation or a carbon, pencil or printed image, is transferred to the target and overwritten following the intermediate model. Tracings might not involve an exact overlay of an entire signature or entry(s). A segmented tracing can result from shifts in the substrate, hesitations during the tracing process, or the use of multiple models in its creation. Distortion due to copying or reproduction of an intermediate model may also preclude an exact overlay.

6.5.6.1 The examiner shall evaluate for evidence of exact replication among multiple writings indicative of duplication by electronic or other means.

6.5.6.2 The examiner shall evaluate features of the questioned writing that deviate from the characteristics of the purported writer to determine whether they include natural handwriting characteristics of the person making the simulation or tracing.

6.6 Evaluation of Observations

The examiner shall consider the results of the above procedures in relation to the scope of examination based on the characteristics, features, or information under observation as interpreted with the knowledge, skills, and abilities acquired through appropriate education, training, and experience.

The examiner shall form a conclusion for each set of comparisons with respect to the results of the above procedures and report accordingly.

The bases and reasons for the conclusion(s) and opinion(s) shall be included in the examiner's documentation. Limitations shall also be documented if present.

6.7 Review of Work

The examiner shall review all observations, comparisons, evaluations, and relevant documentation in accordance with applicable standards and policies. The examiner shall consider alternative interpretations.

6.8 Results

6.8.1 Conclusion(s), or opinion(s), or observation(s) may be reached after following the appropriate procedures outlined in this standard. A conclusion is not based solely upon any one characteristic, but rather on the combination of characteristics within the set of writing in conjunction with any limitations that may be present. The number and nature of the examination results are dependent on the question(s) at hand.

6.8.2 Methods of reporting may be dictated by confidentiality, laboratory policy, and rules of procedure.

6.8.3 For generally accepted phrases expressing conclusions, refer to professional Forensic Document Examination organizations and published standards.

Annex A **(informative)**

Bibliography

The following bibliography is not intended to be an all-inclusive list, review, or endorsement of literature on this topic. The goal of the bibliography is to provide published standards directly used in the preparation of this standard.

- 1] *SWGDOC Standard for Examination of Handwritten Items*, 2013.^c
- 2] *SWGDOC Standard Terminology Relating to the Examination of Questioned Documents*, 2013.³

^c Available from: <http://www.swgdoc.org/index.php/standards/published-standards>



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